

TORONTO'S ADVANCED MANUFACTURING SECTOR

Annual economic impact:

\$43B

People employed:

300,000

U of T'S CONTRIBUTION Bench Strength in Related Research & Innovation

Research funding
attracted in last 5 years:

\$561M

Canada Research Chairs:

25

Faculty members:

362

Graduate students supervised:

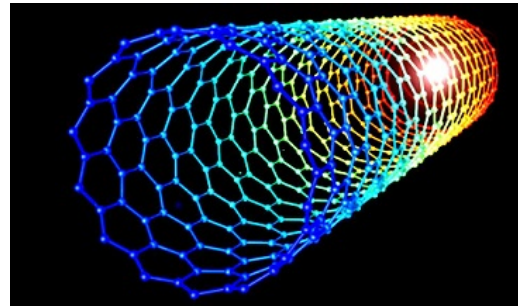
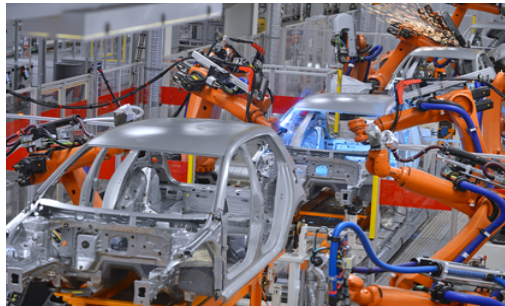
1,370

Startups created in last 10
years:

100

ADVANCED MATERIALS & MANUFACTURING

The **Toronto region** is one of North America's leading centres for advanced materials and manufacturing, and a primary location of the federal Advanced Manufacturing Supercluster, an initiative that will boost next-generation manufacturing capabilities, incorporating technologies like advanced robotics, 3D printing, digital manufacturing, computer-integrated manufacturing, and visioning systems. The sector employs almost **10 % of the City of Toronto's workforce** and contributes **13 % of its total GDP**. Advanced manufacturing is a key driver of the local and provincial economies, and companies across sectors throughout the region, including biotech, health, ICT, machinery and equipment, automotive, and aerospace, are leading its adoption.



HOW U of T ENHANCES THE CLUSTER

U of T is a hub for advanced materials and manufacturing research that attracts leading thinkers, experts and innovators. Over 250 companies and industry organizations collaborate with U of T on advanced manufacturing research, including the American Institute of Steel Construction, BMW, Celestica, DuPont, Holcim, IBM, Proctor & Gamble, Toronto Hydro, and Vale. U of T's world-class facilities include the **Toronto Institute of Advanced Manufacturing (TIAM)**, which sponsors the Master of Engineering Emphasis in Advanced Manufacturing program, and the **Myhal Centre for Engineering Innovation & Entrepreneurship**, which is home to flexible, technology-enhanced active multi-disciplinary learning spaces and fabrication facilities to test new ideas and support design projects. U of T research also supports innovative social enterprises, such as Nia Technologies, a non-profit organization that is testing a cutting-edge 3D printing technology to create high-quality, better-fitting prosthetics in developing countries. By enabling industry to do more with less, U of T's advanced manufacturing experts are enhancing global prosperity, reducing our environmental impact and improving quality of life.

KEY EDUCATIONAL AND RESEARCH PROGRAMS

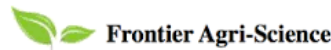
- 3D Printing
- Advanced Manufacturing & Materials Engineering
- Artificial Intelligence & Materials
- Aerospace Studies
- Biomaterials & Biomedical Engineering
- Chemistry
- Chemical Engineering & Applied Chemistry
- Civil Engineering
- Design and Manufacturing
- Electrical & Computer Engineering
- Environmental Engineering
- Geological and Mining Engineering
- Hydrometallurgy

- Intelligent Decision Engineering
- Materials Science Engineering
- Mechanical & Industrial Engineering
- Microcellular Plastics
- Multifunctional Lightweight Structures
- Nanomaterials
- Organic Optoelectronics
- Physics
- Robotics & Automation
- Smart & Multifunctional Materials

KEY FACILITIES & INITIATIVES

- 3D Printing @ Gerstein + MADLab
- Advanced Design and Manufacturing Institute
- Centre for Advanced Nanotechnology
- Centre for Advanced Coating Technologies
- Centre for Research and Applications in Fluidic Technologies (CRAFT)
- Centre for Aerial Robotics Research & Education
- Centre for Biocomposites & Biomaterials
- Institute for Aerospace Studies
- Institute for Multidisciplinary Design & Innovation
- Institute for Robotics and Mechatronics
- Joint Program in Transportation
- Myhal Centre for Engineering Innovation & Entrepreneurship Ontario Centre for Characterization of Advanced Materials
- Ontario Centre for the Characterization of Advanced Materials
- Toronto Institute for Advanced Manufacturing
- Toronto Nanofabrication Centre

U of T INNOVATION IMPACT



Cast Connex

Carlos de Oliveira was a graduate student in Civil Engineering when he came up with an idea to develop a seismic-resistant joint for buildings constructed in earthquake-prone regions. Today, he is the CEO of Cast Connex, a North American industry leader in standardized and customized cast steel structural components for buildings and bridges. The Toronto-based company offers structural engineering design-build services for projects across North America, including the construction of New York's new World Trade Center 3. Cast Connex is also part of an industry-wide coalition to prepare Haiti for another major earthquake like the one that devastated the country in 2010.

FlowJEM

FlowJEM is a Toronto-based microfluidics company that provides services to customers across North America and around the world. Microfluidic technology allows for manufacturing of devices for applications such as lab-on-a-chip. The company originated in the work of the Kumacheva Polymer Materials Group at the University of Toronto. Originally developed for research and development projects, FlowJEM's focus is on the rapid prototyping of robust, customized templates that are used to create microfluidic devices in a variety of thermoplastics.

Opalux

Founded by Professor Geoffrey Ozin and his student André Arsenault, Opalux is a global leader in photonic colour technology research and development. The company is dedicated to the invention of new ways of creating and manipulating colour at dramatically reduced cost and heightened functionality. Its flagship products, photonic ink and elastic ink, offer a new way to create optically variable security devices to combat counterfeiting and improve the authentication of banknotes, passports, and other high-value items.



UNIVERSITY OF
TORONTO