

Advanced Manufacturing Project Profiles

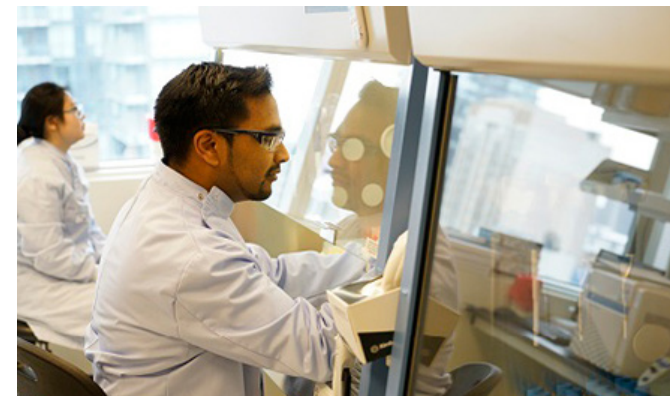


Photos by: The Centre for Commercialization of Regenerative Medicine (CCRM), the Centre for Advanced Therapeutic Cell Technologies (CATCT) and the Centre for Cell and Vector Production (CCVP).

Manufacturing Critical Reagents for Life-Changing Cell and Gene Therapies

It is difficult to understate the impact that recently approved cell and gene therapies (CGTs), have had on the field of medicine. Not only have they provided curative treatments for cancer, blindness and a fatal childhood genetic disorder, but they have spurred the clinical development of hundreds of new CGTs to treat previously thought "incurable disorders". Both events have led to an unprecedented leap in the global demand for viral vectors, gene delivery vehicles that are essential raw materials for these curative treatments.

iVexSol Canada iVexSol (intelligent Vector Solutions) Canada is a newly formed lentiviral vector (LVV) manufacturing company with a proprietary technology that can produce at least 10 times the quantity of potent, high-quality vectors in 20% of the current production time. iVexSol Canada, Inc. is working with partners CCRM Enterprises Inc., and Global Life Sciences Solutions Canada ULC (formerly GE Healthcare) to develop a robust manufacturing platform that can meet the global demand for these critical reagents. This collaborative project will also attract and retain highly educated talent in Canada, drive



growth in the Canadian CGT ecosystem, and attract other companies to establish in Canada, spurring innovation in the medical, engineering and environmental fields, and other supportive industries.

"Establishing an advanced manufacturing platform from a clinically proven technology requires a diversity of skills and resources not found in a

Facts & Figures

- Creating new products, processes and services
- Licensing opportunities for commercialization of new technologies
- This project supports 20 jobs and is expected to create 470 new jobs over 5 years
- 2 of 3 partners in the consortium are SMEs

single entity. With the generous support of NGen and our Partners, we can provide a robust supply of high-quality vectors to therapy providers that are delivering life-changing therapies to patients. This in turn will bring new advanced manufacturing capabilities to Canada and establish the country as a world leader in gene-delivery tools and technology."

Dr. Rodney L Rietze, CEO, iVexSol Canada

Development and Validation of Automated Patient Specific Medical Device Software for Improved Additive Manufacturability



Improving the Quality of Orthopaedic Surgery

A consortium, led by Orthopaedic Innovation Centre (OIC) and including partners Pega Medical Inc., Numalogics a subsidiary of Spinologics, Conceptualiz, and Precision

ADM Inc, is developing a fully integrated platform that is expected to result in the provision of customized medical devices that can be manufactured "on-demand,"

simplifying surgeries, expediting the length of healing and return to function, and improving patients' quality of life. The project will revolutionize the manufacturing of orthopedic implants by integrating medical science, precise imaging, virtual design and testing, with industrial 3D printing. The new made-to-order implants will offer an alternative to off-the-shelf, standardized devices. In addition to ensuring a better fit, the personalized 3D printed medical implants are expected to be comparable in cost to factory-produced models.

"This project bridges and integrates processes in the North American health care system and the advanced manufacturing sector, bringing together top medical device designers, manufacturers, distributors and physicians with software experts and qualified medical additive manufacturing suppliers in Canada to create a new standard of patient care."

OIC

Facts & Figures

- This project aims to reduce healthcare costs for custom devices, reduce wait times for complex surgeries and provide better device fit, funding and longevity to patients
- Creating new products, processes and services
- The project currently supports 24 jobs and anticipates creating 30 jobs over 5 years and 100 jobs over 10 years
- Licensing opportunities for commercialization of new software
- 4 of 5 partners in the consortium are SMEs

Transforming Auto Parts Manufacturing

Molded Precision Components is partnering with Niigon Machines Ltd. to develop a new manufacturing process that will transform the way automotive components are made, allowing cycle times to be cut in half, increasing productivity and decreasing costs. The project will create long term sustainability in the industry and result in new high tech jobs.

"NGen's support will allow MPC to double production rates in our facility, which will enable us to gain margins that will allow for the scaling up of our systems resulting in new world class manufacturing facilities, and new high paying technical jobs in Canada."

Molded Precision Components

Facts & Figures

- The project led to the addition of production lines with new innovative technology and an additional \$10M investment for additional applications for COVID-19
- \$1.5 million in new sales directly linked to the project
- 27 jobs supported by the project and 100+ jobs expected over five years
- Georgian College supporting as an ecosystem partner
- The project is leading to energy efficiency, reduced cycle times and supply chain security by building this manufacturing capability in Canada



Protecting the Environment

Exergy Solutions leads a consortium that includes Suncor Energy and Precision ADM Inc. The consortium is developing additive manufacturing solutions to reduce the environmental impact of oil sands industrial users. The project will develop new oil sands and mineral processing technologies aimed at reducing energy intensity and enhancing reliability, as well as cleantech to drastically reduce water usage and potentially eliminate tailings ponds. The project lays the groundwork for industrial additive manufacturing technology across Canada,

potentially creating multiple spin-off business opportunities – both in terms of other sectors, as well as the manufacturing facilities to serve these sectors.

"NGen funding allows for the involvement of local SME's, and offers expansion opportunities for both Exergy and Precision ADM into the mining industry via Suncor. The project aims to deploy advanced additive manufacturing as a way for Canada to become a global technology leader in the industry."

Exergy Solutions

Facts & Figures

- The consortium is creating new products, processes and services that offer solutions to significant environmental challenges
- The project currently supports 24 jobs and anticipates creating 30 jobs over 5 years and 100 jobs over 10 years
- 2 of 3 partners in the project consortium are SMEs



Photo by: Stephen Waterfall

Revolutionizing Steel Production

For decades, steelmakers have looked into a vat of molten steel to determine when it's ready to cast into slabs. Now steelmaking is going digital. The ArcelorMittal Dofasco-led consortium, including IBM Canada Ltd., Tenova Goodfellow Inc., and i-50 Canada, is creating a smart technology platform to digitally transform ArcelorMittal Dofasco's secondary ladle metallurgy facility. The project will advance the capabilities and understanding of the digitalization process in a heavy manufacturing environment. Key findings will be gained in the areas of process execution required to implement intelligence, the standards required to enable the flow of data, as well as the impact on the workforce. This is especially critical as all global industrial economies are racing towards these goals.

In addition to the key members of the consortium, the project also brings together

research and collaboration partners from McMaster University, Mohawk College, University of Toronto, University of Windsor, Western University, National Research Council, Natural Resources Canada, Haltech Regional Innovation Centre, Mitacs and Prosensus.

"Collaboration is key to becoming a global leader in advanced manufacturing technology. NGen's funding support encouraged the inclusion of SMEs and Canadian suppliers that may not have been otherwise included. The supercluster framework enabled collaboration between many partners to accelerate completion and meet the diverse technical needs of the project."

Roger Tang-Poy, Vice President Technology,
ArcelorMittal Dofasco

Facts & Figures

- Dofasco is developing a platform for the deployment of advanced digitization technologies
- 29 jobs and 3 students involved in the project
- 2 SMEs participating in the project
- Generating new IP in the form of protected patents, expert knowledge and trade secrets
- Additional funding from MITACS

New Materials for Cleantech

NGen funding is allowing Evercloak, along with partner ZEN Graphene, to develop a commercially viable process for graphene and thin-film membrane production that will be primarily applied in the cleantech sector. The commercialization of Graphene Oxide (GO) technology, both in production and thin-film manufacturing will unlock a number of other potential product opportunities.

"Developing a process that is commercially viable will allow Evercloak and ZEN Graphene to become world leaders in the production and application of graphene and thin-film membrane, opening up opportunities in additional sectors."

Evercloak

Facts & Figures

- New products and processes
- Additional funding from MaRS, NRC IRAP and FedDev
- The project has retained 10 jobs, created 20 new jobs and anticipates creating up to 400 new jobs in the future
- Creating new IP with patent opportunities and trade secrets for both project partners



Building a Mega-Machine

Etobicoke, ON-based Conrex Steel Ltd. is leading a collaborative project that will create the world's most sophisticated steel forming press. The project, conducted in partnership with Concord, ON-based Macrodyne Technologies Inc. and Brampton, ON based Source Industrial Services Inc., will bring new capacity and data to manipulate large thick panels for domestic shipbuilding needs on Canada's East and West coasts, international sphere storage vessel forming and finally thick steel heads for pressure vessels throughout North America. The consortium aims to challenge conventional capabilities

and push new possibilities within the industrial use of Canadian steel, strengthen Canadian supplier networks, and showcase unique Canadian IP and manufacturing capabilities in press and crane technologies.

"Over the long-term, this project will elevate Canada's ability to compete with European, Asian, and American steel fabricators, all the while strengthening demand for domestic talent within the steel industry."

Larry Harrison, President, Conrex Steel Ltd.

Facts & Figures

- Enhanced customization and data collection will enable Conrex to investigate different opportunities in new sectors such as avionics and nuclear products
- Conrex will invest in marketing and outsourced sales to promote their advanced capabilities worldwide
- This initiative will double Conrex's revenue in three years, add new jobs, new IP and allow further investment to establish industry leadership in the Americas
- The consortium is also engaging academic partners to support data collection and interpretation
- 31 jobs supported by the project

Maximizing Machine Efficiency

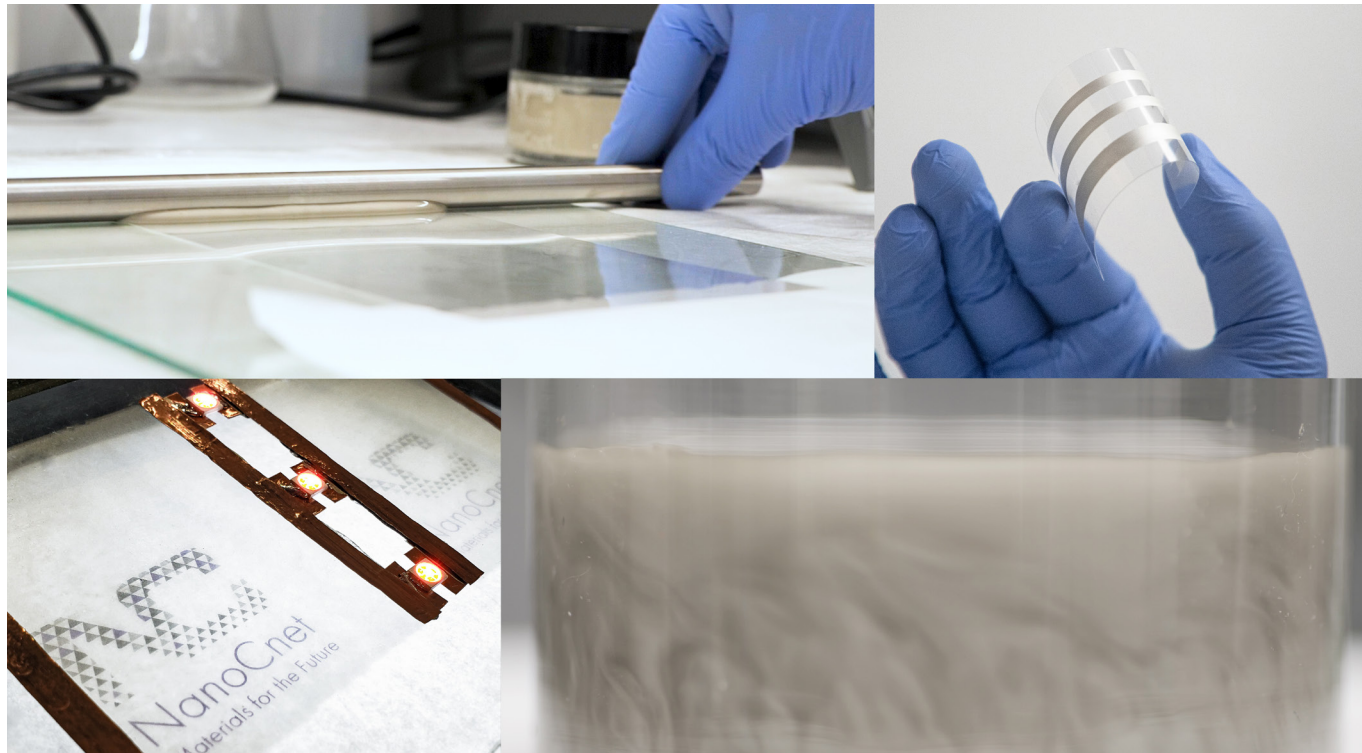
Panevo has partnered with Accuenergy to pilot ioTORQ LEAN OEE software platform which utilizes the latest IIoT technologies to enable cost-effective, real time monitoring of production assets to help manufacturers identify inefficiencies, boost productivity and reduce waste.

"NGen support enabled us to develop the latest IIoT technologies that will enable manufactures to unlock the maximum potential of their assets, increase productivity and transition to Factory 4.0. We now have immediate plans to scale this solution with other industrial partners and develop a global presence."

Panevo

Facts & Figures

- New products, services and processes
- 3 new jobs created by project
- Trade secrets developed as a result of dashboard creation
- 10 jobs supported by project



Developing new Cleantech Possibilities

NanoCnet is developing a printing process capable of depositing continuous and uniform ultra-thin films of Nano Silver Strands utilizing partner Evercloak's proprietary roll-to-roll advanced manufacturing printing process. With NGen support, NanoCnet will design an automated manufacturing system to scale up Nano Silver Strand production, creating a system which can manufacture flexible transparent electrodes and heaters utilizing Nano Silver

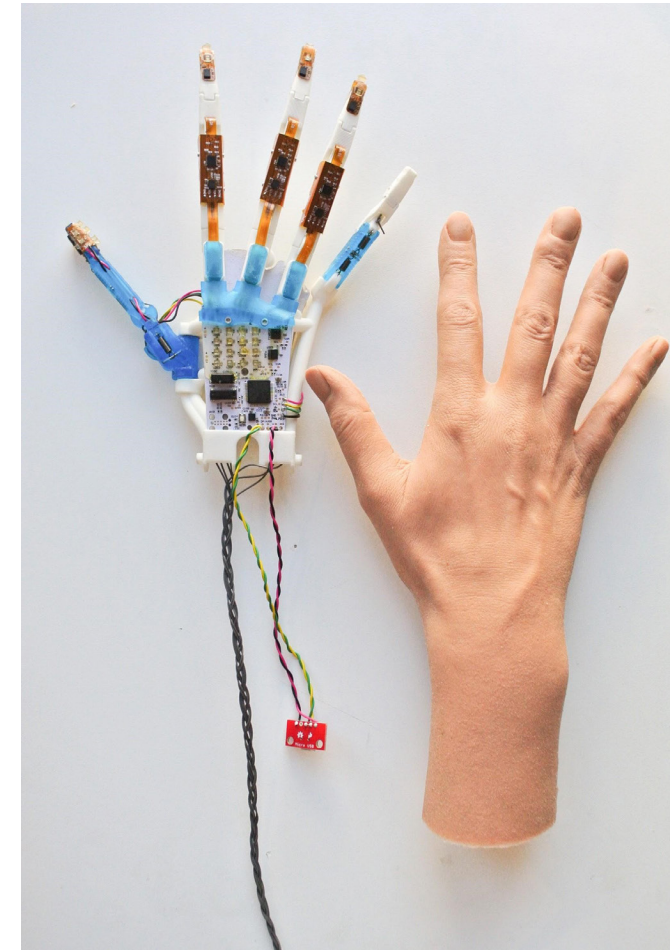
Strand technology with a diverse range of clean technology applications.

"This innovation in manufacturing will dramatically change the printed electronics industry, as well as the electronics industry in general, while disrupting elements of numerous other industries such as the automotive and aerospace industry. This system will provide Canada with a significant competitive advantage across these industries."

NanoCnet

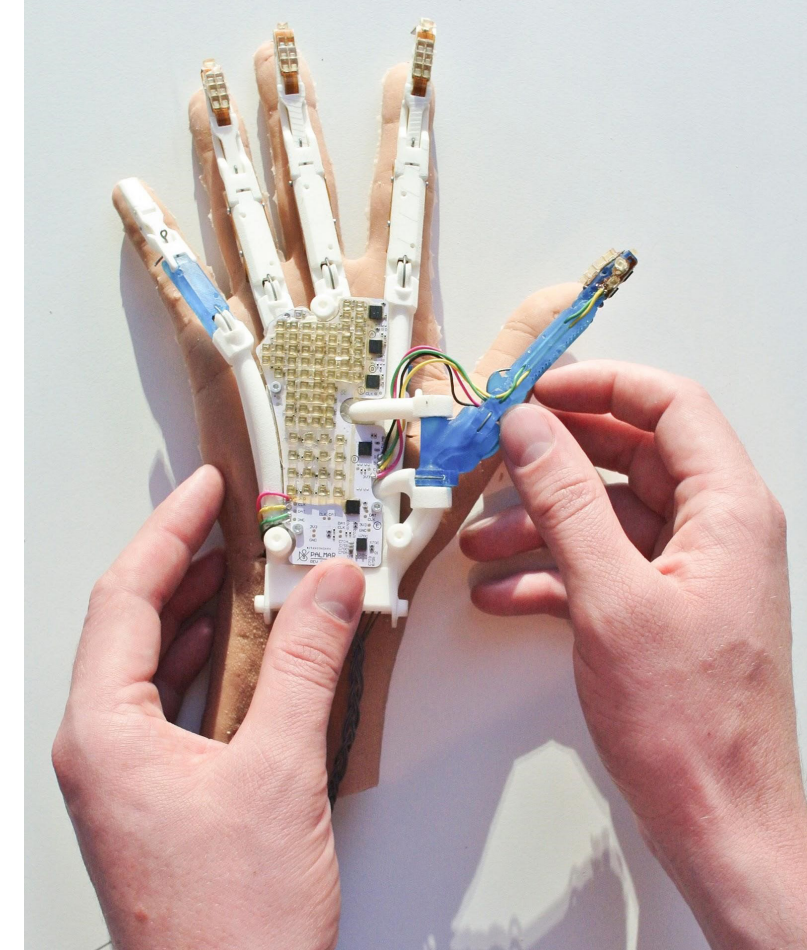
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- This project will enable NanoCnet to meet a growing demand for transparent, flexible heaters
- NanoCnet is working with the University of Waterloo and McMaster University to support characterization of films and materials
- Additional funding from MaRS and FedDev
- Both companies involved in the consortium are SMEs
- 7 jobs supported by the project



A Next Generation Robotic Hand

Sanctuary is partnering with reconstructive plastic hand surgeon Dr. Chris Doherty and Forcen Technology to develop a robotic hand to mimic the mechanical capability of a human hand for functional small part assembly and object manipulation. The project will showcase an anthropomorphic robotic hand match the functional equivalency of a human hand.



"This project will result in the development of a prototype demonstrator device that can then be commercialized, allowing Sanctuary and our partners to take a prominent lead in robotic manufacturing."

Sanctuary

Facts & Figures

- Sanctuary is developing new processes and IP with patent opportunities
- 4 new jobs were created through this project
- 7 jobs supported by project