Products & Services Catalogue

OCTOBER 2018

IC-1805

Enabling innovation across Canada's National Design Network

CMC Microsystems delivers a nationwide, shared platform of tools and services to Canada's micro-nano innovators, helping to create the economy of the future.

- **25** multi-project wafer services available through nine foundries worldwide, offering industrial-scale manufacturing
- **40** university-based micro-nanotechnology (MNT) fabrication labs across Canada, helping researchers customize their designs
- **80** pieces of test equipment for loan in lab
- **560** CAD tools and modules
- **600** development systems
- **450** design flows, user guides and application notes

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This product catalogue is a representative sample of the products and services available to Canada's National Design Network®.

More online www.cmc.ca

CAD

Tools

A robust selection of tools and design environments, available to academic researchers in Canada and R&D specialists in industry. Easily access these tools with local desktop access or through CMC Microsystem's Cloud infrastructure. CMC Cloud provides researchers with high-performance, remotely accessible EDA resources for design of advanced microsystems and nanotechnologies.

Learn more about design kits and services to help you prototype your design, see page 10.

Available to academics in Canada with subscription. For industry pricing, contact us at fab@cmc.ca.

FPGA and Embedded Systems/Software		
Vendor	**Tool**	**Description**
Altium	Altium Designer	Altium Designer is an EDA software package used for implementing schematic, PCB design, FPGA and embedded software design as well as providing Mixed-Signal simulation, and analog and digital circuit analysis.
ARM	ARM DS-5	ARM DS-5 is an integrated development environment based on the Eclipse IDE. It contains the ARM Compiler, Debugger for bare-metal, RTOS and Linux and Android platforms.
	ARM Fast Models	Fast Models is an environment for the creation of ARM-based virtual platforms that execute with high simulation speeds.
IAR SYSTEMS	IAR Embedded Workbench for ARM Cortex-M	IAR Embedded Workbench for ARM Cortex-M provides an integrated development environment (IDE) that allows users to develop and manage complete application projects for ARM Cortex-M based embedded systems.
intel FPGA	Intel FPGA Development Tools	Tools for hardware and embedded design for Intel FPGAs.

Vendor	Tool	Description
Mentor Graphics	Higher Education Program	The Canadian Academic Mentor Graphics Higher Education Program offering for National Design Network researchers includes IC Nanometer Design, Design, Verification and Test, PCB PADS and HyperLynx Bundle, and Tanner Suite.
National Instruments	NI LabVIEW Design Tool	The NI LabVIEW is a software tool for creating and deploying measurement and control systems. It supplies an integrated environment for design, simulation, instrument control, hardware-in-the-loop verification, and microsystem device characterization and validation.
Synopsys	North American University Bundle	Tools for embedded systems, FPGA, digital and mixed signal IC design and verification, and design for manufacturability and test.
	Synopsys ASIP Designer	ASIP Designer is a tool suite that enables rapid design and implementation of Application-specific instruction-set processors (ASIPs), achieving high performance and low power, while maintaining software programmability.
VectorBlox	Vectorblox MXP Maxtrix Processor IP	The VectorBlox MXP™ Matrix Processor is a scalable soft-core processor designed for FPGAs. It implements classic massively parallel vector processor algorithms traditionally used in scientific super-computers.
Xilinx	Xilinx ISE/Vivado Design Suite	Suite of design tools for logic, connectivity, embedded systems and DSP design for Xilinx FPGAs; includes ISE Design Suite: System Edition, Vivado HLS (formerly AutoESL), and Partial Reconfiguration Flow.
	Xilinx SDAccel	The SDAccel™ development environment for OpenCL™, C, and C++, enables up to 25X better performance/watt for data center application acceleration leveraging FPGAs.
	Xilinx SDSoC	Xilinx SDSoC provides a comprehensive and easy to use application development environment for embedded C/C++ applications targeting Xilinx Zynq SoCs.

Photonic		
Vendor	**Tool**	**Description**
Photon Design	CrystalWave and OmniSim Design Tools	CRYSTALWAVE is a design environment for the layout and design of integrated optics components and OMNISIM is a design environment for the omni-directional layout and design of integrated optics components.
	FimmWave Design Tool	FIMMWAVE is a software tool from Photon Design supporting waveguide mode solvers, advanced finite-difference and finite-element solvers, and fibre solvers. Includes FIMMPROP for modeling bidirectional propagation of light through 3D structures.
Design Workshop Technologies	dw-2000	dw-2000 is an integrated environment consisting of a full-featured Layout Editor, a comprehensive Design Rule Checker, a LVS and a Data Conversion Module sharing a common powerful Programming Environment, allowing almost unlimited extendability.
LUCEDA PHOTONICS	Luceda IPKISS.EDA	Luceda IPKISS.EDA is a Silicon Photonics design tool. It can be used with Tanner design suite to form an integrated design environment.
lumerical	Lumerical INTERCONNECT	Lumerical Solutions INTERCONNECT CAD tool is a photonic integrated circuit (PIC) design and analysis environment. Included with the tool is a library of PIC elements, optical sources and measurement elements.
Optiwave	OptiBPM Optical Simulation Software	OptiBPM is a comprehensive CAD environment used for the design of complex optical waveguides based on the beam propagation method (BPM).
	OptiFDTD Design Tool	OptiFDTD is a software tool from Optiwave for the modeling and analysis of passive and nonlinear photonic components for wave propagation, scattering, reflection, diffraction, and polarization, based on the finite-difference time-domain method (FDTD).
ARM	OpticStudio Professional Optical Design Tool	A set of tools for optical lens system designs, lens libraries, import and export capability for porting designs into 3D models for manufacture, and a superior Knowledge Base (KB) available at no charge to users mastering this CAD tool.
RSOFT	RSoft Component Design Suite	RSoft supplies photonic and network design automation products.
Mentor Graphics	Silicon Photonics for Industrial Access	The tool suite includes the IC Nanometer Design Package – a suite for the design, capture, layout, and verification of silicon photonics circuits.

Microelectronics (including PCB, 3D Design, and TCAD)

Vendor	Tool	Description
cadence ACADEMIC NETWORK	Cadence Academic Suite - for Teaching	Consists of CAD tool bundles for the design, simulation, verification, layout, and analysis of ASIC and PCB designs.
	Cadence University Software	Consists of CAD tool bundles for the design, simulation, verification, layout, and analysis of ASIC and PCB designs.
COVENTOR	CoventorMP Design Tool	CoventorMP provides 3D MEMS simulation, analysis and design automation software for the development of micro- and nano-scale devices and systems.
KEYSIGHT TECHNOLOGIES	Keysight Technologies EDA	Keysight Technologies Design Automation (EDA) is a set of designer tools for high-frequency system, circuit and modeling applications.
Mentor Graphics	Higher Education Program	The Mentor Higher Education Program offers for National Design Network researchers.
	Expedition	Expedition Enterprise provides a complete PCB design portfolio of best-in-class solutions for engineering, design, analysis, manufacturing, and data management.
	Tanner Tool Suite	The Tanner Suite offers products for the design, layout, and verification of analog, mixed signal, MEMS designs, and photonics. *New: Tanner Tool Suite is now available as part of Mentor Graphics Higher Education Program.*
softMEMS	MEMS Pro	MEMS Pro is a flexible, powerful, and easy-to-use CAD tool suite for the design and analysis of micro-electro-mechanical systems (MEMS).
	MEMS Xplorer	MEMS Xplorer combined with the Cadence Custom IC Tools Suite creates a powerful and robust solution for both MEMS and IC design.
SYNOPSYS	North American University Bundle	Tools for embedded systems, FPGA, digital and mixed signal IC design and verification, and design for manufacturability and test. This bundle includes Sentaurus TCAD.
solido	Solido Variation Designer	Solido Design Automation offers a suite of design analysis and optimization tools under the product bundle Variation Designer.

Multiphysics		
Vendor	**Tool**	**Description**
FEI	Amira and Avizo 3D Software	Amira and Avizo are a 3D data visualisation, analysis and modeling software.
COMSOL	COMSOL Multiphysics	COMSOL provides software solutions for multiphysics modeling.
ANSYS	ANSYS Campus Solutions	The ANSYS Campus Solutions bundle provides access to the majority of offered ANSYS software, including but not limited to ANSYS Multiphysics, HFSS, Maxwell, SpaceClaim, FLUENT, and many more.
	ANSYS Campus Solutions – for Teaching	The ANSYS Teaching licence bundle provides access to the majority of ANSYS software in the Academic Campus Solutions bundle.
SOLIDWORKS	SolidWorks Professional	Dassault Systèmes SolidWorks Corp. offers complete 3D software tools that let you create, simulate, publish, and manage your data.

Learn more about the future of Photonics, Microelectronics, and MEMS/NEMS.
Visit our updated technology roadmap www.cmc.ca/roadmap

Request product and service support from a CMC staff member or visit our online community forum to post questions and search for solutions.

OFFERINGS INCLUDE:

- Central licensing for 40 + vendor tools
- Infrastructure to enable software use anytime, anywhere
- Support for local installations without need local technical resources
- Training, tutorials, hosting of vendor lead workshops and webinars

Contact support@cmc.ca

New Offering

Luceda IPKISS.EDA

Luceda IPKISS.EDA is a Silicon Photonics design tool. It can be used with Tanner design suite to form an integrated design environment.

For more information contact licensing@cmc.ca

Coming Soon

Tanner L-Edit Photonics

Provides significant productivity improvement with a layout-centric design flow.

For more information contact licensing@cmc.ca

Coming Soon

CAD Compute Cluster

A dedicated group of servers enabling researchers to improve the performance of large computational tasks. Speed up your simulations! CMC engineers provide assistance in utilizing the infrastructure as well as domain knowledge on utilizing HPC infrastructure.

For more information contact licensing@cmc.ca

FAB

Multi-Project Wafer Fabrication Services

A wide selection of technology options and Multi-Project Wafer (MPW) runs for researchers who intend to create a working prototype. New technologies are under consideration. www.cmc.ca/make

New Offerings

Silicon Photonics General-Purpose Fabrication Process

New process made available through a partnership with Advanced Micro Foundry (AMF). For more information contact fab@cmc.ca.

Open-Gate Silicon JFET

Silicon Junction Field Effect Transistors are fabricated at 3IT.Nano. For more information contact MNT@cmc.ca.

Interposer Platform for 2.5D Integrations

Physical Design Kit only. For more information contact fab@cmc.ca.

Coming Soon

65nm CMOS LP

A low power option for 65nm CMOS through TSMC's shuttle service is on track to become available on future MPW runs. For more information contact fab@cmc.ca.

GF22FDX

22nm Fully Depleted Silicon on Insulator (FDSOI) technology. For more information contact fab@cmc.ca.

FAB | Multi-Project Wafer Fabrication Services

Available to academics in Canada with subscription. For industry pricing, contact us at fab@cmc.ca.

Microelectronics		
Technology	**Price (Subscriber)**	**Foundry**
28 nm CMOS FD SOI	$4,000/mm^2 Minimum charge is for a 1.25 mm^2 design	ST
65 nm CMOS GP	$2,000/mm^2 Minimum charge is for a 1.1 x 1.1 mm^2 design	TSMC
0.13 µm CMOS: CR013G	$750/mm^2 Minimum charge is for a 1.1 x 1.1 mm^2 design	TSMC
0.18 µm CMOS: CMOSP18	$300/mm^2 Minimum charge is for a 1.1 x 1.1 mm^2 design	TSMC
0.35 µm CMOS: CMOSP35	$200/mm^2 Minimum charge is for a 1.1 x 1.1 mm^2 design	TSMC
0.35 µm CMOS - Standard: AMSP35	$225/mm^2	AMS
0.35 µm CMOS - Opto: AMSP35	$225/mm^2	AMS
0.35 µm CMOS - High Voltage: AMSP35	$225/mm^2	AMS
0.35 µm CMOS - Post Processing: AMSP35	$550/mm^2	AMS
0.8 µm CMOS - High Voltage: CMOSP8G	$150/mm^2 Minimum charge is for a 6 mm^2 design	Teledyne DALSA

Kit support: Cadence, Mentor and Synoposys tools. Contact fab@cmc.ca for PDK-specific details.

FAB | Multi-Project Wafer Fabrication Services

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Photonics/Optoelectronics			
Technology	**Kit Support**	**Price (Subscriber)**	**Foundry**
Silicon Photonics General-Purpose Fabrication Process	Mentor Graphics, Pyxis	$3,100 for a 3 x 8 mm² design	AMF
Silicon Photonics General-Purpose Fabrication Process	Tanner-Luceda (new design automation capability)	$3,100 for a 3 x 8 mm² design	AMF
III-V Epitaxy on InP Substrates		Contact fab@cmc.ca	CPFC, Landmark, III-V Labs France
III-V Epitaxy on GaAs Substrates		Contact fab@cmc.ca	FBH Germany, Landmark; ISE Fraunhofer, Azastra
III-V Epitaxy on Ge Substrates		Contact fab@cmc.ca	Azastra, ISE Fraunhofer

MEMS			
Technology	**Kit Support**	**Price (Subscriber)**	**Foundry**
MIDIS	Tanner, Cadence, Coventor	$2,100 for a 4 x 4 mm² design	Teledyne DALSA
PolyMUMPs	MEMS Pro	$325 for a 5 x 5 mm² quartile	MEMSCAP
PiezoMUMPs	Tanner, MEMS Pro, Coventor	$325 for a 5 x 5 mm² quartile	MEMSCAP
Post-Processing for PolyMUMPs	MEMS Pro	$150/design	MEMSCAP

* Prices shown are available to Prototyping Subscribers who are successful in CMC's peer-reviewed resource allocation process. See website for other price options.

Test Equipment

To complement our fabrication services CMC offers more than 100 high-value pieces of equipment through our equipment loan program as well as a selection of fixtures that enable researchers to test and verify the functionality of microsystems, components or systems. www.cmc.ca/test

Packaging & Assembly

Find industry-standard or innovative solutions for component assembly that enable circuit integration and testability, backed with support by experienced engineers and consultants. For a complete list of options or to get a quote, visit www.cmc.ca/packaging

STANDARD PACKAGE OPTIONS

- DIP; CFP/CFQP; CPGA tCUSTOM PACKAGING AND ASSEMBLY
- Single or multi-die (stacked die) assembly services
- Die bumping and flip chip
- Custom Si-Photonic packaging
- Parylene coating
- Die on PCB
- Access to packaging technology through FACT and CNDN MNT laboratories
- And more...

Learn more about the future of Packaging and Multiscale Integration. Visit our updated technology roadmap www.cmc.ca/roadmap

Request product and service support from a CMC staff member or visit our online community forum to post questions and search for solutions.

OFFERINGS INCLUDE:

- Technical support for advanced technologies
- Design rule checking to ensure designs comply with foundry requirements
- Process design kit creation and enhancements
- Hands-on training, tutorials, workshops and webinars
- Multi-project wafer services provide access advanced technologies at reduced price of prototyping
- Seasoned advisors available to assist with packaging, assembly and fixturing requirements

Contact support@cmc.ca

LAB

Custom Fabrication

FINANCIAL ASSISTANCE FOR USER ACCESS TO UNIVERSITY-BASED LABORATORIES

Advance your R&D by taking advantage of the capabilities of more than 40 micro-nanotechnology facilities located at universities across Canada, including mask generation, etching, materials deposition, lithography, and characterization. Financial and travel assistance is available for projects at user-access facilities.
Details: www.cmc.ca/MNT

FACT Services for Microfabrication

Fabrication, Assembly, Characterization, and Test (FACT) Services

PARTICIPATING LABS:

3IT

4D LABS

ccem

GCM Lab

THE nanoFAB UNIVERSITY OF ALBERTA

TNFC

Let us help you turn your design into a successful prototype.
Details: www.cmc.ca/FACT

THE FACT ADVANTAGE:

- One point of contact for nation-wide reach into capability and expertise
- Collaborative problem-solving benefiting from the combined experience of CMC Microsystems and university lab engineers
- Client-focused project management
- Partnerships for pre-production
- Intellectual property (IP) framework to guide IP rights matters

Nanofabrication Process Design Environment

Introducing NanoPDE; A cloud-based design environment for nanotechnology researchers

CONNECT TO LAB CAPABILITIES YOU NEED:

- Locate the equipment, capabilities, and expertise you need to have informed and meaningful conversations with the right lab about the direction of your project.

STREAMLINE DEVELOPMENT AND REDUCE COSTS:

- Leverage documented processes, focus on customization and innovative value add components of your designs, and arrive at the lab better prepared for fabrication.

EXPAND RESEARCH HORIZONS:

- Explore and discover capabilities and processes that make new research directions conceivable.

To learn more about NanoPDE contact MNT@cmc.ca

Test Equipment

Access high-value equipment and fixtures to help characterize and demonstrate proof-of-concepts in your own lab. www.cmc.ca/test

Development Systems and Embedded Software

PLATFORM-BASED MICROSYSTEMS DESIGN AND PROTOTYPING ENVIRONMENTS TO SHORTEN THE DEVELOPMENT CYCLE

Hardware Platforms		
Platform	**Description**	**Core Tech.**
Xilinx Evaluation Kits	**FPGA-based design platforms featuring Xilinx FPGAs, memory and industry-standard peripherals that offer a rich set of features suitable for a wide range of applications.**	
Xilinx ML605	Featuring Xilinx Virtex-6 FPGA	FPGA
Xilinx KC705	Featuring Xilinx Kintex-7 FPGA	FPGA
Xilinx VC707	Featuring Xilinx Virtex-7 FPGA	FPGA
Xilinx KCU105	Featuring Xilinx Kintex Ultrascale FPGA	FPGA
Xilinx ZC706	Featuring Xilinx Zynq-7000 (FPGA + dual-core ARM Cortex-A9 processing unit)	FPGA, SoC
Xilinx ZCU102	Featuring Xilinx Zynq Ultrascale+ MPSoC device (16 nm FinFET FPGA + quad-core ARM Cortex-A53 + dual-core ARM Cortex-R5 real-time processors + ARM Mali-400 MP2 GPU)	FPGA, SoC
Intel/Terasic Development Kits	**FPGA-based design platforms featuring Altera/Intel FPGAs, memory and industry-standard peripherals that offer a rich set of features suitable for a wide range of applications.**	
DE4-530	Featuring Intel/Altera Stratix V FPGA	FPGA
DE5a-Net	Featuring Intel/Altera Arria 10 FPGA	FPGA
Intel Arria 10 SoC	Features Intel/Altera Arria 10 SoC (FPGA + dual-core ARM Cortex-A9 processing unit)	FPGA, SoC
BEE3	Featuring 4x Xilinx Virtex-5 FPGAs	FPGA
BEE4	Featuring 4x Xilinx Virtex-6 FPGAs	FPGA
miniBEE	Featuring 1x Xilinx Virtex-6 FPGA	FPGA

Development Systems and Embedded Software

Platform	Description	Core Tech.
Platforms	**High-performance design platforms for system designs that require large FPGA design capacity, memory and I/O bandwidth suitable for a wide range of compute-intensive applications..**	
Acceleration Platform	FPGA-based development platform targeting research applications running complex computing tasks with an emphasis on FPGA and CPU communication requiring a low-latency and high-bandwidth interface between components. Both Altera and Xilinx-based board are available and OpenCL support is a feature.	FPGA
Nallatech 510T	High-performance multi-FPGA compute accelerator platform for applications requiring high performance, low latency, large design capacity, memory bandwidth and programmability.	FPGA
Heterogeneous Computing Cluster (HCC)	A cloud-based, remotely accessible compute infrastructure specifically designed to build, train, and deploy machine learning models.	FPGA
Heterogeneous Processing Platform (HPP)	Highly customizable, flexible and extensible single node computing system integrating a variety of different types of computational units.	GPU, FPRA, Xeon Phi
SOSCIP Agile Computing Platform	Supported online FPGA systems suitable to applications, including compute-intensive tasks requiring efficient server-side processing in areas such as health, machine learning, signal processing, Monte Carlo simulations and big data analytics.	FPGA
Microsystems Integration Platforms (MIP)	Benchtop environment for multi-technology validation of a micro-device in a system context. The MIP bridges the gap between algorithmic/architectural exploration, stimulus and measurement of sensors and actuators.	PXI
Multiprocessor Array Platform (MPA)	General-Purpose Graphics Processing Unit (GP-GPU) with compatible host workstation. Enables accelerated processing of algorithms and simulations. MPA 1 includes NVIDIA Tesla K20, powered by CUDA parallel computing technology. MPA 2 includes two configurations: NVIDIA Tesla K40; and Intel Xeon Phi 7120 coprocessor.	GPU
Software-Defined Radio (SDR)	High-performance platform with RF, FPGA, CPU and network interfaces, fully programmable from Matlab/ Simulink and proprietary software.	FPGA
Sensor Platform	**Sensor network platforms that fit a variety of research requirements.**	
Wireless Sensor Network Kits	Consist of a selection of motes that can be used for applied and exploratory research activities in a broad spectrum of topics, including Internet of Things (IoT), healthcare, smart sensor systems, wireless communications and networking, distributed systems, sensor fusion algorithm design and validation.	Zigbee, Bluetooth

Development Systems and Embedded Software

Software Platforms		
Platform	**Description**	**Core Technology**
Heterogeneous Computing Middleware Platform (HCMP)	The Heterogeneous Computing Middleware Platform (HCMP) provides middleware that significantly reduces the complexity of developing industrial-strength heterogeneous computing software. Complex tasks such as multi-device memory management, device I/O, kernel scheduling, and dependency management are handled by the platform so that users can focus on writing their applications instead of adhering to complicated specifications.	OpenCL

Locate development systems near you: www.cmc.ca/devsystems

Learn more about the future of Embedded System and Machine Learning Demonstrators. Visit our updated technology roadmap www.cmc.ca/roadmap

Available to academics in Canada with subscription. For industry pricing contact us at HPC@cmc.ca.

Request product and service support from a CMC staff member or visit our online community forum to post questions and search for solutions. Benefit from an experienced team that through consultation develop specifications and deliver platform-based microsystem design and prototyping environments that shorten research and development cycles.

Coming Soon

Multi-FPGA GPU Cluster

Multi-core CPUs, many-core GPUs and FPGAs in a pre-validated cluster platform to scale-up and scale-out your heterogenous computing workload.

For more information contact HPC@cmc.ca

Community

CMC and Canada's National Design Network: Building a Vibrant Microsystems Community

Discover, communicate, and connect through the CNDN Hub. This online virtual community space offers a variety of opportunities, including:

- Access to technical advice and know-how
- Engineering support
- Collaborative spaces- view the projects currently underway or start your own
- Follow and participate in ongoing product, project and technical discussions

Contact support@cmc.ca

National Annual Gathering of Micro-nano Innovators

CMC's annual celebration of micro-nanosystems research excellence brings together Canada's academic, industry, and government leaders with top graduate students from science and engineering communities.

www.innovation360.ca

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