

Curriculum Vitae
Seth Dworkin, Ph.D., P.Eng., FCSME
Canada Research Chair (Tier II)
in High Performance Computing for Sustainable Energy

Professor
Mechanical and Industrial Engineering
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EDUCATION

Yale University – New Haven, Connecticut, USA

2009 – Ph.D., Mechanical Engineering
2005 – M.Phil., Mechanical Engineering
2004 – M.Sc., Mechanical Engineering

McMaster University – Hamilton, Ontario, Canada

2003 – B.Eng., Mechanical Engineering, *Summa Cum Laude*

CURRENT POSITIONS

August 2020 – present:

Faculty of Engineering and Architectural Science, Dimensions Faculty Chair – Ryerson University

April 2020 – present:

Professor, Mechanical and Industrial Engineering – Ryerson University

April 2017 – present:

Canada Research Chair (Tier II) in High Performance Computing for Sustainable Energy

PREVIOUS POSITIONS

January 2015 – April, 2020:

Associate Professor, Mechanical and Industrial Engineering – Ryerson University

June 2011 – December, 2014:

Assistant Professor, Mechanical and Industrial Engineering – Ryerson University

April 2009 – May, 2011:

Postdoctoral Fellow and Lecturer, Mechanical and Industrial Engineering – University of Toronto

SELECTED HONOURS

Awards and Accolades

- 2020 – Research Excellence Award of The Combustion Institute, which “recognizes Combustion Institute members who have made contributions of innovative and prolific research with a significant impact on the field of combustion”
- 2019 – Inducted as a Fellow of the Canadian Society of Mechanical Engineering, for “having attained excellence in mechanical engineering and contributed actively to the progress of the profession and of society”
- 2017 – McMaster University Alumni Association Arch Award, recognizing the achievements of McMaster alumni within fifteen years of graduation

- 2015 – Professional Engineers of Ontario (PEO), Engineering Medal – Young Engineer, given to one recipient annually in Ontario, for exceptional achievements in career, community and professional participation before the age of 35.
- 2014 – Ryerson University Early Research Career Excellence Award, given to one Ryerson faculty annually for research achievements within five years of becoming a faculty member (\$2000 research grant).
- 2013 – Canadian Society for Mechanical Engineering (CSME) “I. W. Smith Award,” given annually to one recipient in Canada, for outstanding achievement in creative mechanical engineering within ten years of undergraduate graduation.

Scholarships and Fellowships

- NSERC Post-Doctoral Fellowship (PDF), 04/2010 – 05/2011
- Ontario Ministry of Research and Innovation Post-Doctoral Fellowship, 05/2009 – 05/2011
- American Society of Engineering Education NDSEG Research Fellowship, 2005 – 2008
- NSERC PGS-D Doctoral Research Fellowship, 2005 – 2008

PUBLICATIONS AND PRESENTATIONS

Summary

Peer-reviewed journal publications:	51 published/accepted (+5 under review)
Media features:	15
Keynote Addresses and Invited Seminars:	10
Conference Papers with Oral Presentations:	79 published/accepted (+1 submitted)
Published Abstracts with Oral Presentations:	33 (+0 submitted)
Poster presentations:	23 presented (+0 submitted)
Technical reports:	24
Invention Disclosures	2

Selected Recent Peer-reviewed Journal Publications; Trainee’s names underlined;

1. M. Jadidi, L. Di Liddo, **S. B. Dworkin**, “A Long Short-term Memory Neural Network for the Low-cost Prediction of Soot Concentration in a Time-dependent Flame,” Submitted to *Energies*, *minor revision requested*.
2. R. Daneshazarian, S. Antoun, **S. B. Dworkin**, “Melting of Nano Phase Change Material (Nano-PCM) in a Cylinder Cavity: Numerical Approach,” Submitted to *Int. J. Heat Mass Tran.*, *minor revision requested*.
3. M. Jadidi, S. Kostic, L. Zimmer, **S. B. Dworkin**, “An Artificial Neural Network for the Low-cost Prediction of Soot Emissions,” *Energies*, 13 (2020) 1-17.
4. A. Mansouri, L. Zimmer, **S. B. Dworkin**, N. A. Eaves, “Impact of Pressure-based HACA Rates on Soot Formation in Varying-Pressure Coflow Laminar Diffusion Flames,” *Combust. Flame*, 218 (2020) 109-120.
5. S. Shukla, R. Daneshazarian, A. Mwesigye, W. H. Leong, **S. B. Dworkin**, “A Novel Radiant Floor System: Detailed Characterization and Comparison with Traditional Radiant Systems,” *Int. J. Green Energy*, 17 (2020) 137-148.
6. A. Mwesigye, A. Kiamari, **S. B. Dworkin**, “Energetic Optimization and Exergetic Performance Investigation of an Ejector System Using HFO-1233zd(E) as a Refrigerant,” *Int. J. Refrig.*, 112 (2020) 155-171.

7. A. Mansouri, N. A. Eaves, M. J. Thomson, **S. B. Dworkin**, “Influence of Pressure on Near Nozzle Flow Field and Soot Formation in Laminar Co-flow Diffusion Flames,” *Combust. Theor. Model.*, 23 (2019) 536-548.
8. T. Dembeck-Kerekes, J. P. Fine, J. Friedman, **S. B. Dworkin**, J. J. McArthur, “Performance of Variable Flow Rates for Photovoltaic-Thermal Collectors and the Determination of Optimal Flow Rates,” *Sol. Energy*, 182 (2019) 148-160.
9. L. Zimmer, S. Kostic, **S. B. Dworkin**, “A Novel Soot Concentration Field Estimator Applied to Sooting Ethylene/air Laminar Flames,” *Eng. Appl. Comp. Fluid.*, 13 (2019) 470-480.
10. A. Mwesigye, **S. B. Dworkin**, “Performance Analysis and Optimization of an Ejector Refrigeration System Using Alternative Working Fluids under Critical and Subcritical Operation Modes,” *Energy Convers. Manag.*, 176 (2018) 209-226.

Selected Media Features

1. Featured in “Investing in the Cities of the Future at Ryerson,” *Innovating Canada*, published in the *National Post* print edition, December 17, 2020, <https://www.innovatingcanada.ca/environment/investing-in-the-cities-of-the-future-at-ryerson/>
2. Featured in “The green building revolution will start from the ground up,” *Construction Links Network*, November 9, 2020, <https://constructionlinks.ca/news/the-green-building-revolution-will-start-from-the-ground-up/>
3. Interviewed by the Canadian Broadcasting Corporation (CBC) Radio Program “Here and Now” on the City of Toronto’s Plan to Create Renewable Natural Gas from Green Bin Organic Waste. July 20, 2018.
4. Quoted by the CBC in “Biofuel mixture could cut jet particle emissions by more than half, study suggests,” March 18, 2017 <http://www.cbc.ca/news/technology/biofuels-reduce-effects-climate-change-1.4026752>
5. Interviewed for “CTV Toronto: Lights out for Earth Hour,” *CTV Toronto News*,” March 29, 2014, <http://toronto.ctvnews.ca/video?clipId=315890>

RESEARCH GRANTS AND AWARDS

Summary (note that values in the summary consider only my appropriated portions of shared grants)
 Externally funded projects: **\$2,992,688** and 9420.5 CPU-years¹ (total value: \$5,372,928)

Research Support – Selected Major Projects/Grants

#	Agency, Program, Sources	Project Title (PI or CoPI)	Value (%)	Award Dates
1	NSERC Discovery	Understanding Soot Formation from Combustion with Numerical Modelling (PI)	\$230,000 (5×\$46,000), 2020 COVID-19 Supplement \$7360 (100%)	Apr 1, 2019 - Mar 31, 2024
2	NSERC Discovery Accelerator Supplement	Understanding Soot Formation from Combustion with Numerical Modelling (PI)	\$120,000 (3×\$40,000) (100%)	Apr 1, 2019 - Mar 31, 2022

¹ Compute Canada is a CFI funded computational infrastructure granting organization that grants CPU-years based on a competitive peer-reviewed application process.

3	Canada Research Chair (Tier II)	Canada Research Chair in High-Performance Computing for Sustainable Energy (PI)	\$500,000 (100%)	Apr 1, 2017 - Mar 31, 2022
4	NSERC CRD, OCE Voucher for Innovation and Productivity II, Ryerson University, McClymont and Rak Engineers Inc.	NSERC: Development of a Thermally Enhanced Nanomaterial for Ground Energy Storage (PI) OCE: McClymont & Rak: Nano-engineered Underground Thermal Storage for Ground Source Heat Pumps and Solar Thermal Heating (PI)	Total: \$750,000 NSERC: \$320,000 OCE: \$150,000 Rye: \$120,000 MCR: \$160,000 (64%)	Sept 1, 2017 - Mar 31, 2021
5	Ontario Ministry of Research and Innovation – Early Researcher Award, Ryerson University	Understanding and Mitigating Engine Emissions (PI)	Total: \$150,000 ERA: \$100,000 Rye: \$50,000 (100%)	Apr 1, 2016 - Mar 31, 2021
6	NSERC CREATE, Ryerson University	NSERC CREATE Program in Clean Combustion Engines (CoPI, PI is M. Thomson at U. Toronto)	\$1.65M (12.3%) Rye: \$60,000 (100%)	Mar 4, 2013 - Mar 31, 2019
7	NSERC Discovery	Developing Numerical Models for the Combustion and Soot Formation of Alternative Fuels (PI)	\$217,000 (7×\$31,000) (100%)	Apr 1, 2012 - Mar 31, 2019
8	Canadian Foundation for Innovation (CFI) – LOF, Ontario Research Fund – RI, Ryerson University	Application of High Performance Parallel Computing to the Numerical Simulation of Biofuel Combustion and Combustion-Generated Emissions (PI)	Total: \$248,184 CFI: \$119,092 ORF: \$119,092 Rye: \$10,000 (100%)	Awarded Aug 9, 2012

STUDENT SUPERVISION:

Summary

Postdoctoral fellows supervised: 6 completed, 2 in progress
 Ph.D. students supervised: 7 completed, 3 in progress
 Masters students supervised: 19 completed, 2 in progress
 Undergraduate students supervised: 18 completed, 1 in progress

Current Post-Doctoral Fellows

#	Name	Research Project	Start Date
1	Dr. Mehdi Jadidi	Combustion Studies, Sole Supervision	Jan 6, 2020
2	Dr. Sylvie Antoun	Thermal Storage Caissons with Phase Change Material and Nanofluids, Sole Supervision	June 20, 2019

Current Graduate Students

#	Name	Program Information	Start Date
1	Andisheh Khanehzar	Ph.D., Sole Supervision	Sept 8, 2020
2	Francisco Cepeda	Ph.D., Sole Supervision <i>Awarded Ryerson Graduate Scholarship for International Students (\$15,000)</i>	Sept 3, 2019
3	Reza Daneshazarian	Ph.D., Sole Supervision <i>Awarded Ontario Graduate Scholarship for International Students (\$15,000 x 2)</i> <i>Awarded Ryerson Graduate Scholarship (\$15,000)</i> <i>MIE Graduate Excellence award (\$2000)</i> <i>Awarded the Centre for Urban Energy-Toronto Hydro Student Award - 2019 (\$2500)</i> <i>Awarded the Centre for Urban Energy-Toronto Hydro Student Award - 2020 (\$1250)</i> <i>Awarded MITACS Research Training Award (\$3000)</i>	Sept 5, 2017
4	Luke Di Liddo	MASc., Sole Supervision <i>Awarded NSERC Canada Graduate Scholarship (\$17,500)</i> <i>Awarded MITACS Research Training Award (\$3000)</i>	May 4, 2020
5	Pedram Hatefraad	MASc., Sole Supervision <i>Awarded the Stalin Boctor Graduate Award (\$4484)</i>	Apr 29, 2019

Current Undergraduate Research Students

#	Name	Project Title and Information	Start Date
1	Leya Kober	Helical Steel Piles for Geo-exchange Applications <i>Awarded NSERC USRA (\$4500)</i>	April 29, 2019

SELECTED SERVICE ACTIVITIES

Service Activity (Highlights) at Ryerson

Hiring, Appointments and Evaluation Committees

- Vice-Provost and Dean, Yeates School of Graduate Studies Search Committee, 2018/2019
- Mechanical & Industrial Engineering, Departmental Hiring Committee (DHC), 2018/2019
- Mechanical & Industrial Engineering Chair Search/Reappointment Committee, 2018
- Associate Vice-President Research and Innovation Search Committee, 2017/2018
- Chair, Mechanical & Industrial Engineering Department Evaluations Committee (DEC), 2015/2016
- Faculty of Engineering and Architectural Science, Associate Dean of Graduate Studies Search Committee, 2016
- Mechanical & Industrial Engineering Chair Search/Reappointment Committee, 2015
- Mechanical & Industrial Engineering, Departmental Hiring Committee (DHC), 2014/2015
- Mechanical & Industrial Engineering, Departmental Hiring Committee (DHC), 2013/2014
- Mechanical & Industrial Engineering, Departmental Hiring Committee (DHC), 2012/2013

Proposal Review Committees

- Ryerson Innovation Circle Application Reviewer, Spring 2019 competition
- Internal RTI Equipment Fund Committee, 2012, 2013, and 2014 competitions
- Mechanical & Industrial Engineering Ontario Graduate Scholarship (OGS) Committee, 2013

- RA/URO Application Review Committee, Summer, 2013
- RA Application Review Committee, Fall, 2012

Departmental Positions and Representation

- Mechanical & Industrial Engineering Department Council Speaker, 2020/2021 and 2021/2022 academic years
- Mechanical & Industrial Engineering Awards Night Master of Ceremonies, 2018, 2019
- Mechanical & Industrial Engineering Department Council Secretary, 2012/2013 and 2013/2014 academic years
- Ryerson RFA rep's council representative, 2 year term from 2014-2016
- Ryerson RFA rep's council representative, 2 year term from 2011-2013

External Service and Professional Activities (Highlights)

Conference Chairing Activities

- Combustion Institute Canadian Section Spring Technical Meeting 2018 – Lead Conference Organizer and Chair (141 participants), responsible for organizing registration, abstract submission, paper submission and review, venue, catering, social events, local outing, managing a team of volunteers, and arranging discounts with local hotels and restaurants
- NSERC CREATE Clean Combustion Engines Summer School 2017 – Local Host (43 participants)
- Conference Session Chair – chaired 11 conference sessions at national and international meetings

Review activities

- Reviewed 13 major grant proposals, including from the US Department of Energy, Partnership for Advanced Computing in Europe, Chilean National Science and Technology Commission, and NSERC
- Reviewed over 90 journal manuscripts and 1 book proposal

Review and Organizing Committees

- Chair, Bernard Lewis Fellowship Selection Committee, The International Combustion Institute – 2020
- International Sooting Flame Workshop, Program Leader for Laminar and Pressurized Flames, 2016 – 2018 (responsible for co-organizing the workshop and determining session topics)
- Bernard Lewis Fellowship Selection Committee, The International Combustion Institute – 2018
- International Sooting Flame Workshop, Program Leader for Laminar Flames, 2012 – 2016 (responsible for co-organizing two workshops and determining session topics)
- Compute Canada Resource Allocation Committee (RAC) member and chair for Engineering, Mathematics and Computer Science, 2014/2015 (performing scientific reviews of computational infrastructure requests from Canadian faculty, and chairing committee meetings that allocate resources)

ACTIVITIES RELATED TO FOSTERING EQUITY, DIVERSITY, AND INCLUSION (EDI)

Internal Activities related to EDI at Ryerson University

1. Dimensions Faculty Chair, Faculty of Engineering and Applied Science – In September, 2020 I was appointed to the role of Dimensions Faculty Chair for a Tri-council pilot program aiming to understand and address EDI barriers in research. In my role as chair, I lead a team of trainees at the undergraduate, graduate, and postdoctoral level (distinct from members of my research group) to study and understand EDI barriers in the Ryerson research ecosystem. As a Dimensions chair, I regularly meet with counterparts in each faculty, led by a Dimensions Faculty Director, do discuss approaches to collect data, understand barriers, and develop new initiatives designed to foster EDI in research, and eradicate barriers.

2. Fostering inclusivity in my research group – I am aware of the historical barriers that have hindered particular groups from advancing in the academy and I strive to maintain an inclusive environment in which all researchers feel welcome, comfortable, and can thrive. I keep an open door policy and encourage dialog with each researcher. I make it clear that I have zero-tolerance for discrimination and bias, and that I engage in life-long learning and self-reflection on my own pre-conceptions, misconceptions, unconscious bias, and privilege. I encourage my trainees to do the same. My trainees are a diverse group who come from all over the globe; North and South America, Europe, Africa, The Middle East, and Asia. They have included HQP who are the first in their family to attend university, and HQP who identify as LGBTQ2S++. At all times, I embrace and encourage diversity.
3. Creation of the “Dworkin Group Philosophy and Code of Conduct” – In 2018, I led the creation of the *Dworkin Group Philosophy and Code of Conduct*, which gets distributed to each new group member. It was created by four group members who represented a cross section of diversity, gender, and seniority, under my supervision, and in consultation with the rest of the group. The document outlines our commitment to equity and inclusivity, and lists ten points of conduct that each group member agrees to follow. The code of conduct serves as a reminder that our actions effect others, and that we need to be sensitive to the viewpoints and needs of others. It is a living document, in that it is also open to change and evolution as new developments are made.

External Activities related to EDI

4. I was selected as one of seven representatives of Ryerson to attend the Athena SWAN Round Table Discussion held at U. Toronto on March 22, 2019. The full-day workshop brought together representatives from the Toronto area universities to discuss equity, diversity, inclusion, institutional change, and the implementation of a Canadian version of the Athena SWAN program. Athena SWAN (Scientific Women’s Academic Network) is a British government organization that celebrates and recognizes institutional achievements towards the advancement of gender equity and representation. The workshop provided new insights on advancing and celebrating inclusivity activities, and how to contribute to an environment in which the greatest portion of participants can thrive.

Research Activities Benefitting Indigenous Peoples and Northern Communities

1. Geothermal Piles for Northern Communities – One ongoing research project focuses on the development of helical steel piles for building foundations that contain internal heat exchangers which can be used with ground source heat pumps. The specialized drilling equipment required for traditional geothermal installations has been a significant barrier towards adoption the north. By contrast, these new piles significantly reduce the cost of installing geothermal heating and cooling systems as they are portable, modular, and do not require specialized drilling. In addition, as they extract heat from the ground, they can be engineered to remediate the risks that melting permafrost poses to existing building foundations. This means that marginalized groups, such as Indigenous communities, would benefit from access to sustainable heating systems and improved structural stability of older buildings that were constructed on permafrost. Our research is now seeking to understand the installation of these heat exchangers into various types of permafrost conditions, and integration into existing northern Canadian building practices.
2. Collaboration with *Growing North* – I have had significant collaboration with *Growing North*, a Ryerson based not-for-profit that designs and builds greenhouses to address food scarcity in northern communities. I led a project to design sustainable heating alternatives for the *Growing North* greenhouses that could extend their growing season from three months to twelve months per year. The project involved detailed computer simulation of greenhouse heating needs in northern climates, and iterative design of heating options in close collaboration with Growing North staff.

TEACHING

Courses Taught at Ryerson University

Undergraduate:

F2020 – MEC817: Combustion Engineering
F2019 – MEC817: Combustion Engineering
F2018 – MEC817: Combustion Engineering
W2018 – MEC810: Thermal Power Generation
W2017 – MEC810: Thermal Power Generation
W2016 – MEC810: Thermal Power Generation
F2015 – MEC514: Applied Thermodynamics
W2015 – MEC810: Thermal Power Generation
F2014 – MEC817: Combustion Engineering
F2013 – MEC817: Combustion Engineering
W2013 – MEC817: Combustion Engineering
F2012 – MEC514: Applied Thermodynamics
W2012 – MEC810: Thermal Power Generation
F2011 – MEC514: Applied Thermodynamics

Graduate:

F2020 – ME8151: Combustion Engineering
S2020 – ME/AE8112: Computational Fluid Dynamics and Heat Transfer
F2019 – ME8151: Combustion Engineering
S2019 – ME/AE8112: Computational Fluid Dynamics and Heat Transfer
F2018 – ME8151: Combustion Engineering
S2018 – ME/AE8112: Computational Fluid Dynamics and Heat Transfer
F2014 – ME8151: Combustion Engineering
W2013 – ME8112: Computational Fluid Dynamics and Heat Transfer

Courses Taught at University of Toronto as a Sessional Instructor

W2011 – MIE1210: Computational Fluid Mechanics and Heat Transfer
W2010 – MIE1210: Computational Fluid Mechanics and Heat Transfer
F2009 – AER334: Numerical Methods, Course Coordinator and Instructor