ANNUAL REPORT

July 1, 2015 to June 30, 2016

Department of Mechanical and Materials Engineering

Western Engineering

Western University

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MESSAGE FROM THE DEPARTMENT CHAIR

Welcome to Western's Department of Mechanical and Materials Engineering! This is my last report as I have stepped down as chair on June 30, 2016. Department greatly improved in the last ten years including undergraduate program, graduate programs as well as research activities. Our students are provided with an education that is solidly based in the fundamentals, infused with creativity and innovation, and geared to instill a strong ethical responsibility commensurate with the engineering profession. They are well prepared to take on leadership roles in industry and government when they leave our programs.

The Department had 253 full time and 29 part-time undergraduate students (years 2, 3 and 4) and 166 graduate students during this academic year. The second year enrolment reached 117 students. The Mechatronics Program offered jointly with the Department of Electrical and Computer Engineering exceeded planned enrolment by 100% and has reached enrolment of 48. We awarded 59 BESc degrees, 50 MEng degrees, 16 MESc degrees and 5 PhD degrees this year. It is the first time in its history that Department awarded more graduate than undergraduate degrees. At the same time the number of faculty members decreased to 21.5 full time equivalents. We plan to cap the mechanical program at 120 entering the second year in September 2016 while Mechatronics program will be expanded up to 75 students entering the second year. We think that we are still the right size, where we are small enough to offer personal attention to our students and large enough to have broad, state-of-the-art technical expertise. Our numerous, high quality graduates are sought after by industrial employers from across the country, whilst many others continue on to graduate, medical, dental, business and law schools, all taking with them core skills in engineering design. Indeed, every year, our senior undergraduates work on “real world” design projects sponsored by a variety of companies.

In the past year, we have spent a lot of effort preparing for the large number of students entering our program. We have reviewed all courses as well as invested heavily into laboratory equipment required to handle expanding enrolment. Expansion of the Mechatronics program required creation of a separate set of courses designed specifically for students in this program. Renovations of the Design and Manufacturing Studio have been completed. Re-organization and renovations in the Digitally-Enabled Manufacturing Methodologies Laboratory have been essentially completed. Our courses expose students to the use of sensors, actuators and controls, which are essential elements of modern intelligent mechanical systems. Our laboratories are among the best in the country according to external reviewers.

We have expanded the scope of our graduate professional programs in order to address society's needs. Enrolment in these programs has reached the planned capacity. Our program in Heating, Ventilation and Air Conditioning (HVAC) addresses the current preoccupation with energy and its efficient use. The program in Engineering and Medicine addresses the needs of our aging society and the opportunities associated with maintaining healthy life styles, while the program in Composite Materials focuses on the automotive as well as biomedical industries both of which require improved and lighter materials. Large enrolments in these programs testify to their success.

Our department has several active student societies including the American Society of Mechanical Engineers (ASME), the Society of Automotive Engineering (SAE), the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) and the Canadian Society for Mechanical Engineering (CSME). These student societies have regular meetings, field trips to companies who hire our students and they participate in regional competitions and meetings. We encourage them to participate in collegiate design competitions including the Formula SAE race car, the SAE Baja car, the solar car, the concrete toboggan, the SAE Aero remote-controlled aircraft and others.

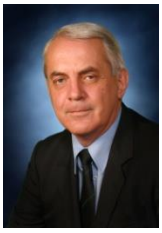
Many or our faculty members are highly recognized in their field and have earned numerous honors and awards from different engineering societies. With annual externally funded research expenditures exceeding $2.5 million, research support is derived from major Federal research funding agencies, such as the Natural Sciences and Engineering Research Council, the Province of Ontario and industry. The Department has several large research laboratories in the areas of thermo-fluids, materials, biomechanics, dynamics, computational mechanics and mechatronics, among others. The major research areas include: (i) Heat transfer, (ii) Fluid mechanics, (iii) Composite materials, (iv) Biomechanics, (v) Micro-Electro-Mechanical Systems (MEMS), (vi) Mechatronics, (vii) Computational Mechanics and (viii) Design. Our research activities place us the third position in the country according to the ratings prepared by the University of Toronto.

We look forward to our continued success in the years to come and we warmly welcome your involvement in ensuring a strong future for Mechanical and Materials Engineering at Western.

J.M. Floryan
Professor and Chair

ADMINISTRATION

Chair



J.M. Floryan, Ph.D., P.Eng.
Professor

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Associate Chair, Graduate Research Programs

K. Siddiqui, Ph.D., P.Eng
Associate Professor

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Office: SEB 3078
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Graduate Research Programs Committee 2015-2016

G. Knopf
M.D. Naish
E. Savory
R. Klassen, Associate Chair, Professional Programs
K. Siddiqui, Associate Chair, Research Programs

Associate Chair, Graduate Professional Programs

R. Klassen, Ph.D., P.Eng.
Associate Professor

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Graduate Professional Programs Committee 2015-2016

R.O. Buchal
L. Jiang
A. Price
A.G. Straatman
K. Siddiqui, Associate Chair, Research Programs
R. Klassen, Associate Chair, Professional Programs

Associate Chair, Undergraduate Affairs

O.R. Tutunea-Fatan, Ph.D., P.Eng.
Associate Professor

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rtutunea@eng.uwo.ca

Undergraduate Curriculum Committee 2015-2016

L. Ferreira
P. Kurowski
L. Jiang
A. Price
C. Zhang
O.R. Tutunea-Fatan, Associate Chair, Undergraduate

AWARDS AND RECOGNITION

R.O. Buchal

Western's Teaching Fellow, (2016)

J.M. Floryan

Fellow of the American Physical Society (2015)
Member of the 111 Program of the People's Republic of China (2015)
Erskine Fellow, University of Canterbury, New Zealand (awarded in 2015, tenable in 2017)

A.G. Straatman

Fellow of the Canadian Society for Mechanical Engineering (CSME), 2016

X. Sun

Fellow of the Canadian Academy of Engineering (CAE) (2016)

FACULTY MEMBERS AND ADMINISTRATIVE STAFF

1. FULL-TIME FACULTY MEMBERS

Asokanthan, S.F., Professor, Ph.D. Office: SEB 2057A
519-661-2111, x 88907 sasokanthan@eng.uwo.ca

Research Interests: Dynamics and Control; Inertial Sensing and Applications; Nonlinear and Stochastic Mechanics; Rotating Flexible Multi-body Systems

Buchal, R.O., Associate Prof, Ph.D., P.Eng. Office: SEB 2069C
519-661-2111, x 88454 rbuchal@eng.uwo.ca

Research Interests: Design Methods and Tools; Design Education; Instructional Technology; Manufacturing Inspection Planning

DeGroot, C.; Assistant Prof., Ph.D., P.Eng. Office: SEB 3096
519-661-2111, x 84455 cdegroo5@uwo.ca

Research Interests: Computational fluid dynamics, high performance computing, algorithms, porous media, water/wastewater treatment

Ferreira, L., Assistant Prof, Ph.D., P.Eng. Office: SEB 3024
519-661-2111, x 86124 lferreira@uwo.ca

Research Interests: Medical Mechatronics; Implantable Transducer Design; Biomechanics of Major Joints Computer-Aided Systems for Orthopaedic Surgery

Floryan, J.M., Professor, Ph.D., P.Eng. Office: SEB 3057
519-661-2111, x 88330 mfloryan@eng.uwo.ca

Research Interests: Fluid Mechanics; Hydrodynamic Stability; Flow Control; Numerical Algorithms; Moving Boundary Problems; Immersed Boundary Conditions Method

Jenkyn, T.R., Associate Prof, Ph.D., P.Eng. Office: SEB 2075
519-661-2111, x 88339 tjenkyn@eng.uwo.ca

Research Interests: Orthopaedic Biomechanics; Advanced Medical Imaging; Musculoskeletal Computational Modeling; Injury Causation Biomechanics; Sport Science

Jiang, L.Y., Associate Prof., Ph.D., P.Eng. Office: SEB 3076
519-661-2111, x 80422 lyjiang@eng.uwo.ca

Research Interests: Nanostructured Materials; Nanomechanics; Piezoelectric Materials; Thin Film Materials; Fracture and Failure Analysis

Johnson, J., Professor, Ph.D., P.Eng. Office: SEB 2076
519-661-2111, x 88255 jajohnso@eng.uwo.ca

Research Interests - Orthopaedic Biomechanics; Implant Design and Analysis; Joint Motion and Load Transfer

Khayat, R.E., Professor, Ph.D., P.Eng. Office: SEB 3086
519-661-2111, x 88253 rkhayat@eng.uwo.ca

Research Interests: Theoretical Fluid Dynamics; Free Surface and Interfacial Flows; Hydrodynamic Stability; Micro-Convective Heat Transfer; Newtonian and Complex Fluids

Klassen, R., Associate Prof, Ph.D., P.Eng. Office: SEB 3075
519-661-2111, x 88323 rklassen@eng.uwo.ca

Research Interests - Micro-Mechanical Properties of Materials; Time-Dependent Deformation of Materials; Microstructure /Mechanical Property Relationships

Knopf, G. K., Professor, Ph.D., P.Eng. Office: SEB 3087
519- 661-2111, x 88452 gknopf@eng.uwo.ca

Research Interests: Engineering Design; Geometric Modeling; Laser Micro-Fabrication; Optical Devices and Systems; Bioelectronics Biosensors

Kuboki, T., Assistant Prof, Ph.D. Office: CMLP 1306
519- 661-2111, x 88519 tkuboki@uwo.ca

Research Interests: Polymer Composites; Biocomposites, Nanocomposites; Polymer Blends; Bioplastics; Natural Fiber; Processing of Polymers and Composities; Plastic Foaming; Mechanical Properties of Polymers and Composites

Kurowski, P., Assistant Prof, Ph.D., P.Eng. Office: SEB 3094
519- 661-2111, x 80125 pkurowski@eng.uwo.ca

Teaching: Product Design, Finite Element Analysis, Mechanical Vibrations, Kinematics and Dynamics,Computer Aided Engineering

Research Interests**: Teaching Methods in Design and Design Analysis, Engineering Curriculum Development**

Naish, M.D., Associate Prof, Ph.D., P.Eng. Office: SEB 2055
519-661-2111, x 88294 naish@eng.uwo.ca

Research Interests: Mechatronic Systems; Computer-Assisted Surgery and Therapy; Surgical Robotics; Sensing Systems; Surgical Training; Medical Devices; Robotics

Price, A., Assistant Prof, Ph.D. Office: SEB 3026A
519-661-2111, x 86420 aaron.price@uwo.ca

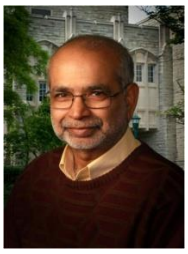
Research Interests: Smart Material Actuators and Sensors; Mechatronic Systems for Industrial Automation and Biomedical Applications; Additive Manufacturing of Advanced Materials; Conductive Electroactive Polymers and Composites; Magnetic and Thermal Shape Memory Materials

Savory, E., Associate Prof, Ph.D., P.Eng, C.Eng Office: 3085
519-661-2111, x 88256 esavory@eng.uwo.ca

Research Interests: Experimental Fluid Dynamics; Wind Engineering; Environmental Flows; Biological Fluid Mechanics

Siddiqui, K., Associate Prof, Ph.D., P.Eng. Office: SEB 3078
519-661-2111, x 88234 ksiddiqui@eng.uwo.ca

Research Interests: Experimental Fluid Mechanics; Turbulence; Interfacial Fluid Dynamics and Heat Transfer; Alternative Energy Systems; Energy Conversion



Singh, A.V., Professor, Ph.D., P.Eng. Office: SEB 2059A
519-661-2111, x 88321 avsingh@eng.uwo.ca

Research Interests: – Computational Methods; Vibrations of Plates and Shells; Mechanics of Composite Materials; MEM and Nano Structures

Straatman, A.G., Professor, Ph.D. P.Eng. Office: SEB 2069B
519-661-2111, x 88249 astraatman@eng.uwo.ca

Research Interests: Computational Fluid Dynamics; Porous Materials; Convective Heat Transfer; Turbulence

Sun, X.A. (Andy), Professor, Ph.D. Office: SEB 3059
519-661-2111, x 87759 xsun@eng.uwo.ca

Research Interests: Nanotechnology; Nanomaterials; Clean Energy Fuel Cells; Lithium Ion Batteries; Energetic Materials

Tutunea-Fatan, O.R., Associate Prof, Ph.D Office: SEB 2063A
519-661-2111, x 88289 rtutunea@eng.uwo.ca

Research Interests: Multi-Axis CNC Machining; Computer-Aided Design and Manufacturing; Intelligent Machining Systems; Numerical Methods

Wood, J.T., Associate Prof, Ph.D., P.Eng. Office: SEB 3061
519-661-3482 jwood@eng.uwo.ca

Research Interests: Structure – Property Relationships; Lightweight Structural Materials for Automotive Applications; Magnesium Die-Casting; Composite Materials

Yang, J., Associate Prof, Ph.D., P.Eng. Office: SEB 3089
519-661-2111, x 80158 jyang@eng.uwo.ca

Research Interests: Nanofabrication; Atomic Force Microscopy (AFM); MEMS/NEMS; BioMEMS; Lab-on-a-chip; Microfluidics; Nanomaterials; Polymers; Biomedical Devices; Biophysics

Zhang, C., Professor, Ph.D., P.Eng.
519-661-2111, x 88345
Office: SEB 2065
czhang@eng.uwo.ca

Research Interests - Computational Fluid Dynamics; Gas-Solid Two-Phase Flows; Vapor-Liquid Two-Phase Flows; Combustions and Emission Controls

2. PROFESSOR EMERITI

J.R. Dryden, Professor, Ph.D. (Windsor)-Materials
J.D. Tarasuk, Professor; P. Eng.; Ph.D.-Mechanical

3. ADJUNCT ACADEMIC PROFESSORS

W. Altenhof, Ph.D.
Department of Mechanical, Automotive & Materials Engineering
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Experimental and numerical modeling of structures subjected to impact/dynamic and quasi-static loading; large deformation of materials; metallic and polymeric foams; crashworthiness evaluation; child safety in vehicles; durability of mining vehicle wheels

G. Avigad, Ph.D.
Mechanical Engineering
Braude College of Engineering
Karmiel, Israel
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Multi-objective and multi modal optimization, evolutionary algorithms, robotics, conceptual design, design for adaptability.

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Automotive Body and Structural Design and Analyses, Geometric Inspection and Coordinate Metrology, Tolerance Analyses, Computer-Aided Design, DFM

E. Bordatchev, Ph.D., Dr.Sc.(Eng)
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High-precision microfabrication; dynamics, monitoring, diagnostics, control and optimization of micromachining processes; micro molds/dies; micromechatronics; MEMS/MOEMS; micromechanisms; microsensors; micromanipulations.

T. Burkhart, Ph.D.
Lawson Health Research Institute
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Orthopaedic biomechanics specifically, the improvement of prevention, treatment, and rehabilitation of musculoskeletal disorders; distal radius fractures, knee joint soft tissue reconstruction, and knee and hip

arthroplasty; three-dimensional kinematics, materials testing, cadaveric testing, finite element modeling, and large animal models.

C.E. Dunning, Ph.D., P.Eng.
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Human Orthopaedic Biomechanics; Joint Replacement (Implant) Design; Joint Kinematics; Impact Loading and Analysis.

R. Gurka, Ph.D.
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Ben-Gurion University of the Negev
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Turbulent and complex flows; Transport phenomena in biological flows; Experimental fluid dynamics.

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Composite materials, in-line compounding of long-fibre reinforced polymers, injection moulding,design and construction of composite parts.

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Metal Formability, Micromechanics, Crystal Plasticity, Instabilities and Localized Deformation Phenomena in Materials, High Performance Computing – Parallel Computing

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Materials and component characterization, neural networks, novel structural methods, vehicle durability, road test simulation, and driver modeling.

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Modelling, simulation, and control of vehicle dynamics, multibody dynamics, finite element analysis, design of vehicle suspension systems.

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Laser micro-processing of materials, high power laser development, photonic band gap materials, porous semiconductors, machine & process dynamics, micro-devices & sensor fabrication, micro-electro-mechanical-systems (MEMS), diode laser joining of materials and multi-kilowatt carbon di-oxide lasers.

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Foaming of Thermoplastics and Composites

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Permanent mold casting of non-ferrous metals, development of lead-free copper alloys for plumbing applications, alloy development and solidification processing of light metals including aluminum and magnesium.

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McMaster University
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Polymer processing, extrusion machinery, composite materials, compounding technology, particle mechanics, foams.

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Material science and engineering, electrochemical engineering and synchrotron characterization of nanostructures for sustainable energy applications.

4. VISITING PROFESSORS

Dr. Khaled Al-Aribe, Department of Mechanical Engineering, Abu Dhabi University, UAE
Dr. Steven Arnoczky, DVM, Michigan State University, College of Veterinary Medicine
Miri Weiss Cohen, Braude College of Engineering, Karmiel, Israel
Dr. Stanislaw Gepner, Warsaw University of Technology, Poland
Prof. Xianqing Liang, Guangxi University, China
Dr. Weirong Nie, Nanjing University of Science and Technology, China
Dr. Wenqing Qu, Beihang University, China

Dr. Ligang Wang, Harbin Engineering University, China
Dr. Kun Zhang, Southwest Jiaotong University, China
Dr. Wei Zhang, Beihang University, China

5. ADMINISTRATIVE SUPPORT STAFF

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Joanna Blom
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6. TECHNICAL SUPPORT STAFF

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Adam Woodhouse
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UNDERGRADUATE EDUCATION

The Department of Mechanical and Materials Engineering offers an accredited program in Mechanical Engineering. In preparation for a career in Mechanical Engineering, the program at Western endeavours to balance the theory and applications necessary for the spectrum of work situations. The first year courses are common with all other disciplines in Engineering. The second and third year courses focus on the fundamental areas of Mechanical Engineering. In the fourth year, students are given an opportunity to select electives in areas of interest or specialization. The program focuses on a broadly based Mechanical & Materials Engineering education that stresses: fundamental engineering concepts, contemporary design practices, development of interpersonal skills, and interaction with engineering practitioners.

1. MECHANICAL ENGINEERING PROGRAM

Second Year Program
Applied Mathematics 2413, ECE 2274A/B, ES 2211F/G, MME 2200Q/R/S/T, MME 2202A/B, MME 2204A/B, MME 2213A/B, MME 2259A/B, MME 2260A/B, MME 2273A/B, MME 2285A/B, Statistical Sciences 2143A/B,

Third Year Program
Applied Mathematics 3413A/B, ECE 3374A/B MME 3303A/B, MME 3307A/B, MME 3334A/B, MME 3350A/B, MME 3360A/B, MME 3379A/B, MME 3380A/B, MME 3381A/B.

Fourth Year Program
There are four options: Mechanical Engineering Option; Mechanical Engineering and Law Option; Mechanical and Medicine Option; Mechanical Engineering and Business Option

Mechanical Engineering Option

Business Administration 2299E, ES 4498F/G, MME 4499. Five of the following technical electives: MME 4401Y, MME 4414A/B, MME 4422A/B, MME 4423A/B, MME 4424A/B, MME 4425A/B, MME 4427A/B, MME 4428A/B, MME 4429A/B, MME 4443A/B, MME 4445A/B, MME 4446A/B, MME 4450A/B, MME 4452A/B, MME 4453A/B, MME 4459A/B, MME 4460A/B, MME 4464A/B, MME 4469A/B, MME 4473A/B, MME 4474A/B, MME 4475A/B, MME 4479A/B, MME 4480A/B, MME 4481A/B, MME 4482A/B, MME 4483A/B, MME 4485A/B, MME 4486A/B, MME 4487A/B, MME 4491A/B, MME 4492A/B. Students may elect to substitute technical electives from other engineering disciplines or from the Faculty of Science, provided they have the required prerequisites, and provided at least half of their technical electives are chosen from the above list. A maximum of two 0.5 courses may be taken from the Faculty of Science and used towards the BESc degree. All courses outside of the MME list must be approved by the Department of Mechanical and Materials

Mechanical Engineering and Law Option

Admission
Before entering the combined BESc/JD degree program, students must have completed the first three years of the Mechanical Engineering program at Western (or equivalent). In addition to applying for the combined degree program through the Office of the Associate Dean - Academic of the Faculty of Engineering, students must also make a separate application to the Faculty of Law for admission into the JD program by the published deadline, May 1. In the application to the Law School, the applicant must indicate that he or she is applying to the combined BESc/JD program.

Admission Criteria
To be eligible for the combined degree program, students must have completed all the requirements of the first year curriculum in the Faculty of Engineering, and the second and third year program, Option B, in the Department of Mechanical Engineering with either a minimum cumulative weighted average (CWA) of 80% or stand in the top 10% of the class. In addition, the applicant must meet the minimum LSAT requirement established by the Law School Admission Committee for all combined degree programs. Entrance into the combined degree program is competitive and limited.

Progression Standards
Once admitted to the combined program, students are required to maintain a minimum year weighted average of 75% in their Engineering curriculum courses and a B average in their Law courses.

Failure to Meet Progression Standards
A student who fails to meet the combined program progression standards in any year will be required to withdraw from the combined program. However, a student who has met the progression standards of either the Engineering or LLB program, will be allowed to proceed to the next year of that program. If the progression standards of both individual programs have been satisfied, the student may continue in either program and may petition the Faculty whose program was not selected for permission to complete that program at a later date. A student who is required to withdraw from the combined program and wishes to pursue either or both of the individual programs, must complete all the degree requirements of the individual program or programs in order to graduate from that program or those programs.

First Year Program
Common first year of Engineering.

Second Year Program
Applied Mathematics 2413, ECE 2274A/B, ES 2211F/G, MME 2200Q/R/S/T, MME 2202A/B, MME 2204A/B, MME 2213A/B, MME 2259A/B, MME 2260A/B, MME 2273A/B, MME 2285A/B, Statistical Sciences 2143A/B,

Third Year Program
Applied Mathematics 3413A/B, ECE 3373A/B, ECE 3374A/B MME 3303A/B, MME 3307A/B, MME 3334A/B, MME 3350A/B, MME 3360A/B, MME 3379A/B, MME 3380A/B, MME 3381A/B

Fourth Year Program
First year Law curriculum. No courses outside Law may be taken during this year.

Fifth and Sixth Year Programs
Two 0.5 Technical electives
MME 4499
In years five and six students must complete the following requirements for the JD:
1. The two compulsory upper-year Law courses
2. At least three Law core-group courses
3. Additional Law courses totalling at least 25 credit hours. One Law course must have an essay requirement of at least two credit hours.
Requirements 2 and 3 must include one of the courses listed below under "Economics" and one listed under "Impact of Technology on Society."
Notes: Fulfillment of the Faculty of Engineering requirement of courses that expose students to the impact of technology on society, ethical issues, and economics must be taken as follows:
• Economics: One of Law 5220 Income Taxation, Law 5555 Corporate Finance, or an approved Law Selected Topics course.
• Ethical Issues: Law 5150 "Legal Ethics & Professionalism" – [part of the first year curriculum].
• Impact of Technology on Society: One of: Law 5615 "Biotechnology Law", Law 5605 "Advanced Issues in Technology Law", Law 5350 "Media Law", Law 5600 "Advanced Intellectual Property", Law 5620 "Information Law", Law 5625 "Intellectual Property", Law 5630 "International Protection of Intellectual Property", Law 5610"Advanced Patent Law", or an approved Law Selected Topics Course.
•Thought Processes of the Humanities and Social Sciences: Law 5110 Constitutional Law, Law 5115 Contracts, Law 5120 Crimnal Law, Law 5140 Property, Law 5145 Torts [part of the first year curriculum]

Exchange Programs
Students enrolled in the combined program are not eligible for an exchange program with the Faculty of Engineering; however, they may be eligible for an exchange through the Faculty of Law in Year Five or Six. This will require advanced planning with both faculties.

Mechanical Engineering and Medicine Option

Admission
Before entering the concurrent BESc/MD degree program, students must have completed the first three years of the Mechanical Engineering program at Western, Option C (Mechanical Engineering and Medicine). In addition to applying for the concurrent degree program through the Office of the Associate Dean - Academic of the Faculty of Engineering, students must also make a separate application for admission into the MD program. As a part of the application process, students must write a letter to the Schulich School of Medicine & Dentistry (Admission Office) indicating their intent to proceed into the concurrent BESc/MD program.

Admission Criteria
To be eligible for the concurrent degree program, students must have completed all the requirements of the first year curriculum in the Faculty of Engineering with a minimum year weighted average (YWA) of 80%, and the second and third year program of Option C (Mechanical Engineering and Medicine), in the Department of Mechanical and Materials Engineering, with a minimum year weighted average (YWA) of 80% in each year. In addition, the applicant must meet the minimum performance standards in the MCAT and GPA, determined by the

Schulich School of Medicine & Dentistry, and must be invited and attend a personal interview with the Schulich School of Medicine & Dentistry. A confidential assessment form, proficiency in English and Basic Life Support Training is also required. Entrance into the concurrent degree program is competitive and limited.

Admission Procedures
A student interested in the concurrent BESc/MD program will apply during the February registration period of the first common year of the Engineering program for admission to the Mechanical Engineering program, Option C (Mechanical Engineering and Medicine). The student must write the MCAT before the third year of the Mechanical Engineering and Medicine program, for the following year's admission into the MD program. Students must apply to the MD program by the deadline established (usually October) by the Ontario Medical School Application Service (OMSAS) during the third year of the Mechanical Engineering and Medicine program.
Admission to the BESc program does not guarantee admission to the MD program. Note: This program is only open to Canadian citizens or permanent residents.

Progression Requirements
A student enrolled in the concurrent BESc/MD degree program must satisfy the following progression requirements:
Year 2: a minimum YWA of 80% in courses taken as a part of Option C (Mechanical Engineering and Medicine)
Year 3: a minimum YWA of 80% in courses taken as a part of Option C (Mechanical Engineering and Medicine)
Year 4: progression requirements of the MD program and successful completion of Engineering courses.
Year 5: progression requirements of the MD program
Year 6: progression requirements of the MD program
Year 7: progression requirements of the MD program and successful completion of Engineering courses.
If the student fails to satisfy the conditions above, he or she will be required to withdraw from the concurrent program and will be required to transfer out of Option C into Option A of the Mechanical Engineering program.

Concurrent Degree Program

First Year Program
Common first year of Engineering.

Second Year Program
Applied Mathematics 2413, ECE 2274A/B**,** MME 2200Q/R/S/T**,** MME 2202A/B, MME 2204A/B, MME 2213A/B, MME 2259A/B, MME 2260A/B, MME 2273A/B, MME 2285A/B, Statistical Sciences 2143A/B, Business Administration 2299E.

Third Year Program
Applied Mathematics 3413A/B, ECE 3374A/B, ES 4498F/G, MME 3303A/B, MME 3307A/B, MME 3334A/B, MME 3350A/B, MME 3360A/B, MME 3379A/B, MME 3380A/B, MME 3381A/B

Fourth Year Program
Regular Year 1 of the MD program.
MME 4499

Fifth Year Program
Regular Year 2 of the MD program.

Sixth Year Program
Regular Year 3 of the MD program.

Seventh Year Program
Regular Year 4 of the MD program less the Advanced Communication Skills course.
MME 499 (will count as an "elective" credit in the fourth year of the MD program).

Mechanical Engineering and Business Option

Admission Requirements

Normally, students apply to the HBA program during their second year in Engineering by the published deadline. Application for the combined program is made during the first year in the HBA program. Students applying to the Ivey Business School's Academic Excellence Opportunity (AEO) are also eligible to be considered for the combined program. Admission to the program is competitive and limited. Upon completion of the program students will receive both an HBA and a BESc degree.

To be eligible for the combined program, all students, including those admitted via the AEO route, must have completed all the requirements of the first year curriculum in the Faculty of Engineering and the second year program in the Department of Mechanical and Materials Engineering. Students must obtain a weighted average (YWA) of 78% in each year. During the second year of the program students are required to complete Business Administration 2257 with a minimum grade of 70%. Demonstrated participation in extra curricular and/or community activities, leadership and work experience are also admission criteria.

Progression Standards
Students in this combined program must meet the following progression standards: Students enrolled in first year HBA (Year Three) must attain at least 78%.

In Years Four and Five, students must attain a minimum weighted average of 75% in their 4000 level HBA courses and a 75% average in their Engineering courses.

Failure to Meet Progression Standards
A student who fails to meet the progression standards in any year must withdraw from the combined program. However, a student who has met the progression standards of either the HBA or BESc program will be allowed to proceed to the next year of that program. If the progression standards of both individual programs have been satisfied, the student may continue in either program and may petition the School or Faculty whose program was not selected for permission to complete that program at a later date. A student who is required to withdraw from the combined program and wishes to pursue either or both of the individual programs, must complete all the degree requirements of the individual program or programs in order to graduate from that/those program(s).

First Year Program
Regular first year curriculum in the Engineering program.

Second Year Program
Applied Mathematics 2413, ECE 227A/B, MME 2200Q/R/S/T, MME 2202A/B, MME 2204A/B, MME 2213A/B, MME 2259A/B, MME 2260A/B, MME 2273A/B, Statistical Sciences 2143A/B, Business Administration 2257.

Third Year Program
Business Administration 3300K, 3301K, 3302K, 3303K, 3304K, 3307K, 3311K, 3316K, 3321K, 3322K, 3323K.

Fourth Year Program
Applied Mathematics 3413A/B, MME 2285A/B, MME 3303A/B, MME 3307A/B, MME 3334A/B, MME 3360A/B, MME 3379A/B, MME 3380A/B, MME 3381A/B, ECE 3374A/B Applied Project Requirement: Business Administration 4569

Fifth Year Program
ES 4498F/G, MME 3350A/B, MME 4499, MME 4492A/B
One 0.5 technical electives
3.0 Business Administration courses: 0.5 course: International Perspective Requirement: Business Administration 4505A/B, 0.5 course: Corporations and Society Perspective Requirement: at least one 0.5 course from Business Administration 4521A/B, 4522A/B, 4523A/B or other business elective as determined and approved by the HBA Program Director to satisfy this requirement. 2.0 elective courses chosen from 4000 level Business courses.

Exchange Programs
Students enrolled in the combined program are not eligible for an exchange program with the Faculty of Engineering; however, they may be eligible for an exchange through the Richard Ivey School of Business in Year Five. This will require advanced planning and approval of both faculties.

Engineering Externship Program (EEP) for Mechanical Engineering

The optional Engineering Externship Program (EEP) allows Mechanical and Materials Engineering students the opportunity to pursue up to an eight-month certificate program after second or third year at an educational institution which will offer courses related to a practical Certificate Program. The EEP program is currently linked to the "Practical Elements in Mechanical Engineering (PEME)" program offered at Fanshawe College of Applied Arts and Technology. Mechanical Engineering students who wish to exercise this option must apply for the EEP Course ES 2275-Mechanical and Materials Engineering Externship Program following their second or third year of Mechanical Engineering. Western Engineering controls entry into the program. Prerequisites are: 60% YWA with no failed courses. If accepted into the program, students will take the courses specified by the PEMS certificate Program linked to ES 2275.

2. UNDERGRADUATE ENROLLMENT

Full Time

	Year 1	Year 2	Year 3	Year 4	Total
Mechanical	n/a	117	73	63	253

Part Time

	Year 1	Year 2	Year 3	Year 4	Total
Mechanical	n/a	3	25	1	29

3. DEGREES GRANTED

Fall 2015	Spring 2016
1	59

4. UNDERGRADUATE AWARDS

Recipients (Fall 2015) – Students registered in the Department of Mechanical and Materials

Andrea Bailey Memorial Award

4th Year MME Awarded to a female student entering fourth year of Mechanical and Materials Engineering who demonstrates financial need, a minimum 75% academic average and involvement in extracurricular activities at the University and in the community. Preference will be given to a student meeting the stated criteria who is in a concurrent degree program. The recipient must not be in receipt of any other award in the Department of Mechanical and Materials Engineering. This award was established by friends and family in memory of Andrea Bailey.

Awarded to: **Katie Spiler**

Ian Duerden Memorial Award

3rd Year MME Awarded to a full-time undergraduate student in his or her third year of the Mechanical and Materials Engineering program who demonstrates financial need and achieves a minimum 75% academic average. This award was established through Foundation Western in memory of Ian Duerden, a former Associate Dean of the Faculty of Engineering.

Awarded to: **Nathaniel Holmes**

Lynda Diane Shaw Memorial Award

4th Year MME Awarded to a student entering the fourth year of the Mechanical Engineering program in good standing. This student must have been active in community service activities, student clubs and extra-curricular activities and possess good interpersonal skills. Established by friends, colleagues and family in memory of Lynda Diane Shaw.

Awarded to: **Asli Nur Ozyoruk**

Andrade Family Award in Engineering

Awarded annually to a full-time undergraduate student in 2nd or 3rd year of the Mechanical and Materials Engineering program, based on a minimum 75% average, and demonstrated volunteer and leadership skills through participation in university life.

Awarded to: **Julien Bertone, Nathaniel Holmes**

Donald P. Morris Engineering Award

Awarded to a full-time undergraduate student in year 2 or higher of any Engineering program based on academic achievement and involvement in extra-curricular activities that demonstrate leadership skills.

Awarded to: **James Calvert**

ASRAE Award

Awarded to: **Matt Kyle**

125th Anniversary Alumni Award in Engineering

Awarded to: **Steven Voorberg**

3M Canada Company Award in Engineering Science

Awarded to: **Jason Ng**

Craig O'Hagan Memorial Award

Awarded to: **Kytin Kwan**

Doherty Engineering Inc. Award in Engineering

Awarded to: **Matt Kyle**

Entrepreneurial Spirit Award

Awarded to: **Jason Ng**

Ontario Professional Engineers Scholarships for Education Scholarships

Awarded to: **Chris Kornas**

Recipients (Spring 2016) Awards of the Graduating Class June 2016 – Students registered in the Department of Mechanical and Materials

The John E.K. Foreman Gold Medal in Mechanical and Materials Engineering

This medal is named in honour of the late Dr. J.E.K. Foreman, the first Professor and Group Chair of Mechanical Engineering in the Faculty of Engineering. It is awarded to the fourth year engineering student in the Mechanical Engineering program with the highest aggregate final marks for the third and fourth years.

Awarded to: **Joshua LeClair**

The ASHRAE Award (1-$500.00 & One Year Membership/Fundamentals Handbook)

Awarded to the fourth-year engineering student in the Department of Mechanical and Materials Engineering, based on the candidate's marks in HVAC I and HVAC II. The student must have a minimum Year Weighted Average of 70

Awarded to: **Mitchell Quathamer**

The Donald D.C. McGeachy Award for Materials Engineering

Awarded to the fourth-year engineering student in the Department of Mechanical and Materials Engineering, who in the opinion of the Faculty has the highest academic standing in Materials Engineering

Awarded to: **Mitchell Campbell**

The Canadian Society for Mechanical Engineering Award

Sponsored by the Canadian Society for Mechanical Engineering, this award is given to a fourth-year engineering student in the Department of Mechanical and Materials Engineering, who demonstrated outstanding achievement.

Awarded to: **Joshua LeClair**

The Governor General's Award Academic Medal

Awarded to: **James Crocker**

Professional Engineers of Ontario Gold Medal

Awarded to: **James Crocker**

5. DESIGN PROJECTS

Projects at a Glance

Project Title	Contact/ Sponsor	Faculty Advisor	Team Structure
Makiwara Striking Post	P. Kurowski	P. Kurowski	Bryan Maingot, Yordano oriega, Nicolas Nogalo
Device for Sleeping Bag Packing	P. Kurowski	P. Kurowski	Stephen Flesch, Mitchell Quathamer, Easton Battler, Joshua Holloway
Arnis Training Device	P. Kurowski	P. Kurowski	Jonathan Dingle, Tyler Bennett, Connor Hunt, Alexis Chang-Powless
Baja Drivetrain	P. Kurowski	P. Kurowski	Arash Forouhideh, Philippe Makinson, Jeffrey Holek
Baja Chassis	P. Kurowski	P. Kurowski	Peter Maccauley, Domenic Lacaria, Mira Kim, Matthew Kyle
Human Jaw Motion Simulator	L. Ferreira Yara Hossein	L. Ferreira	Andrew DiFruscia, Kenneth Ip, Victor Carranza

Redesign of the Wheel Assembly for Western Formula Racing Car	Western Formula Racing	L. Ferreira	Nathan Huffman, Jesspal Sandhu, Ryan Goralczyk, Cory Early
Reduction of the Rotating Mass in Western Formula Racing Powertrain	Western Formula Racing	L. Ferreira	Joel Jefford, Anthony herratt, Nathan Leifer, Juan Vallejo
Density Driven Downburst Release Mechanism	E. Savory	L. Ferreira	Joshua LeClair, Wesley Duns, Matthew Kurmis
HVAC System for a New Two-Storey Municipal Government Building in Beijing, China (ASHRAE Student Competition)	W. Altahan	R. Tutunea-Fatan	Shehroze Nazar, Shan Wong, Yunfeng Liu, Abdul Rafeh
Pump Facility for Laboratory Testing	K. Siddiqui W. Altahan	R. Tutunea-Fatan	Andrew Johnson, Steven Jevnikar, Thomas Jaroslawski
Damage Mitigation for Diesel Exhaust Fluid (DEF) Tank Freeze	General Motors of Canada	P. Kurowski	Mitchell Campbell, Steven Voorberg, Ronald Stevens, Connor Sutton
Design of an Integrated Storage Feature in a Pick-up Truck Tailgate	Meridian Lightweight Technologies	P. Kurowski	Luke Berkmortel, Katelin Spiler, Asli Ozyoruk, Alicia Lenny
Heavy Lift Radio-Controlled Aircraft	Western Aero Design	L. Ferreira	Sotirios Petrou, Julian Shanahan, Victor Lee
SunStang Composite Monocoque Chassis	SunStang	R. Tutunea-Fatan	Elizabeth Fox, Grant Warr, Alexandre Lachance, Dankha Soro
HVAC System for a New Two-Storey Municipal Government Building in Beijing, China (ASHRAE Student Competition)	W. Altahan	R. Tutunea-Fatan	Arman Rasekh, Byeong Yoo, Grace Kusuma, Brendan Van Gool
Development of an Electromechanical System Control via CANbus	S. Asokanthan	L. Ferreira	James Crocker, Justin Peters, Joel Keck
Patient Transportation System for Light Armoured Vehicles	ARES (Armatec Survivability)	L. Ferreira	Brandon Tartaglia, Patrick Lafontaine, Jordan Rose, Claire Sauve

MME 4401y Presentation

Project Title	Student	Faculty Advisor
Experimental investigation of the dependence between cutting temperature and bone burning process	Jason Ng	O.R. Tutunea-Fatan
Characterization of Heat Transfer from a Horizontal Pipe During the Phase Change Process	Katie Spiler	K. Siddiqui
An experimental study of laminar drag-reducing grooves	Tomek Jaroslawski	J.M. Floryan

Development and validation of a finite element model to simulate the opening of a high tibial osteotomy	Victor Carranza	T. Burkhart
The effects of implant structural design on implant joint mechanics	Andrew Johnson	D. Langhor
Introacular pressure simulator for contact lens sensor characterization	Ron Stevens	

5. EXCHANGE PROGRAMS

Incoming Exchange

Last Name	First Name	Home University
Krzak	Bartosz	University of Queensland
Patodia	Anshay	Ontario Maharashtra-Goa Program (OMG)
Soh	Zhen	Nanyang Technological University
Toh	Jing	Nanyang Technological University
Wright	Ruby	University of Western Australia
Choi	Yun Jung	Korea University
Paterson	Alexander	University of Western Australia
Hoarau	Lylian	Ontario Rhone-Alpes Program (ORA)
Mauvigney	Louis	University of Tours
Knebel	Jonas	Ontario Baden-Wurttemberg Program (OBW)

7. INTERNSHIP PROGRAM

The Faculty of Engineering offers an Internship Program for those students interested in gaining practical engineering employment experience in industry. In this program, students spend 12 to 16 consecutive months working in industry between their third and fourth years of the Bachelor of Engineering Science program. Time spent in internship may count as one-year of pre-graduation experience toward the four years experience required for licensing as a Professional Engineer in the Province of Ontario. Any engineering student who is completing third year, has at least a 65% average, is permitted to work in the country in which the job is located and who is in good academic standing may enroll in the program.

The following students from the MME Department completed an Internship in 2015-16

Last Name	First Name	Employer
Achtymichuk	Miguel	Schaeffler Canada Inc.
Bertling	Samuel	Presstran Industries (a division of Magna International)
Bhatti	Aahmed	Honda of Canada Manufacturing
Clenchy	Matthew	Crescent Point Energy
Dawson	Corrine	Transform Automotive
Del Rosso	Adam	Formet Industries - Magna International
Delancey	Calvin	NOVA Chemicals
Endeman	Evan	Formet Industries - Magna International
Gasior	Juliusz	Schaeffler Canada Inc.
Gebremariam	Adonay	Schaeffler Canada Inc.
Gharibo	Jason	Trudell Medical International

Heidenreich	Bennet	Armatec Survivability Corp.
Hinds	Akeem	Honda of Canada Manufacturing
Hulshof	Devin	Medatech Engineering Services Limited
Kernaghan	Glenn	Union Gas Ltd.
Kozlowski	Michael	General Motors of Canada Ltd., Cami Assembly
Loney	Graham	Formet Industries - Magna International
Nielsen	Peter	Trudell Medical International
Reed	Joel	Aerospace Telecommunications and Engineering Support Squadron ATESS)
Santarelli	Joseph	Union Gas Ltd.
Simioni	Gregory	Ontario Power Generation
Tanashi	Ahmed	McCormick Canada
Valencia Vega	Luisa	Celestica
Woodside	Daniel	Inertia Engineering + Design Inc.
Yang	Wei An	Oetiker Limited

8. SUMMER ENGINEERING CO-OP PROGRAM

Last Name	First Name	Employer
Bennett	Tyler	Sle-Co Plastics Inc.
Berkmortel	Luke	Givens Engineering Inc.
Berkmortel	Carolyn	ATTICA Manufacturing Inc.
Bertone	Julien	KSR International Co.
Callender	Julius	INVISTA (Canada) Company
Caskanette	Alexandre (Alex)	Caskanette Udall Consulting Engineers
Cook	Evan	London Machinery, Inc. (an Oshkosh Corporation Company)
Doran	Jeremiah	Labatt Breweries of Canada
Fay	Patrick	Imperial Oil
Gigliozzi	Nicholas	MARS Canada Inc.
Hendriks	Kara	Labatt Breweries of Canada
Hoehne	Adam	Schukra of North America
Holek	Jeffrey	Sealed Air Canada
Hunt	Chad	SAF-HOLLAND Canada, Ltd.
Keenleyside	Andrew	IBM Canada Ltd.
Kyle	Matthew	EDGE Automation, Inc.
Lescanec	Alex	Schukra of North America
Major	Mark	Terepac Corporation
McFarlan	David	Price-Schonstrom Inc.
McWilliam	Malcolm	General Dynamics Land Systems - Canada
Osadca	Michael	Styrolution Canada Ltd.
Ozyoruk	Asli	General Dynamics Land Systems - Canada
Sandhu	Jesspal	Brose Canada Inc.
Satosek	Gerrit	Sle-Co Plastics Inc.

Simic	Joseph	TECSAR ENGINEERING INC.
Sutton	Connor	General Motors Company
Voorberg	Steven	HTS
Watson	Kortney	General Dynamics Land Systems - Canada

9. PEME PROGRAM

Practical Elements in Mechanical Engineering is a certificate program developed by the MME Department at UWO in collaboration with Fanshawe College of Applied Arts and Technology. The PEME program is comprised of practical courses in machining, welding, metrology, etc. and was designed specifically to give university engineering students exposure to the practical side of their profession.

The PEME program was developed mainly in response to the changing backgrounds of students entering university engineering programs. PEME provides an opportunity for interested students to get exposure to some practical courses outside the traditional Mechanical engineering curriculum. The PEME program is thus a formal avenue whereby students have an opportunity to enrich their practical knowledge of their profession by taking specialized courses offered by experts.

Students in the Mechanical & Materials Engineering program at UWO who have at least a 60 percent yearly weighted average with no failures may apply for PEME following their 2nd or 3rd years of study. Since PEME is offered every year, students can combine PEME with a concurrent degree program, summer Co-op or Industry Internship; there are no limitations!

Our major industrial employers are thrilled with the introduction of PEME in the MME program at UWO. PEME gives our students incredible insight into how things are made and enables our graduates to have an immediate impact in industry.

Summer 2015

PEME 1 (ENGSCI 2274A)

1. Currie, Jordan James
2. Davenport, Edward Paul
3. Miceta, Maxim
4. Ochotta, Stephen David
5. Oh, Dong Jae
6. Parsons, Brent Andrew
7. Robitaille Compan, Julie

PEME 2 (ENGSCI 2275A)

1. Eagen, Joshua
2. Liu, Haida
3. Sanajko, Michael

Fall-Winter 2015-2016

PEME 1 (ENGSCI 2274A)

1. Blott, Riley William Armstrong
2. Major, Mark William
3. Scott, Braden Darrel

PEME 2 (ENGSCI 2275A/B)

1. Ochotta, Stephen David (A)

2. Blott, Riley William Armstrong (B)
3. Major, Mark William (B)
4. Scott, Braden Darrell (B)

10. UNDERGRADUATE STORIES

Industry-sponsored undergraduate design projects
There were four externally-sponsored capstone design projects in this year's edition of MME 4499. The projects covered a broad range of engineering applications and their sponsors were: General Motors of Canada, Meridian Lightweight Technologies, Armatec Survivability, and Pure Energy Fitness.

11. VISITING STUDENTS

Funded through *Science without Borders*

Amauri Aires, Instituto Federal de Educação, Brazil
Dates: May–August 2015

Henrique Brighenti, Federal University of Minas Gerais, Brazil
Dates: May–August 2014

Mariana Faggi Merlin, Industrial Engineering, Universidade Estadual de Campinas (UNICAMP), Brazil
Dates: May 5, 2016 to August 29, 2016

Francielle Lemos Cruz, Electronic Engineering Department,Control and Automation Engineering
Federal University of Minas Gerais (UFMG), Bel Horizonte, MG - Brazil
Dates: May 5, 2015 to August 29, 2015

Jehovah Tavares Coelho Neto, Department of Electrical Engineering,Universidade Federal do Ceara, Brazil
Dates: May 5, 2015 to August 29, 2015

Funded through *Mitacs Globalink*

Ashika Agrawal, National Institute of Technology, Rourkela (India)
Dates: May 9, 2016 to August 29, 2015

Reyes Hurtado José Antonio, Department of Electronics and Communication Engineering
The University of Guadalajara, Guadalajara, Jalisco México
Dates: May 5, 2015 to August 29, 2015

Visiting Undergraduate (Research only) students

Gurbir S. Basi, Mechanical Engineering, PEC University of Technology, Chandigarh, India
Dates: Jan. 2016 to Jun. 2016

Pierre-Yves Mao, École Polytechnique de l'Université de Nantes, France
Dates: June 28, 2016 to August 31, 2015

Emmanuelle Orreindy Institut National des Sciences Appliquées, Centre Val de Loire, France
Dates : June 29, 2015 to August 30, 2015

Lovepreet S. Sidhu, Mechanical Engineering, PEC University of Technology, Chandigarh, India
Dates: Jan. 2016 to Jun. 2016

GRADUATE EDUCATION

The Department offers two types of graduate programs, i.e., research programs leading either to the Master of Engineering Science (M.E.Sc.) degree or to the Doctor of Philosophy degree (Ph.D.) and course-based Professional Degree Programs leading to the degree of Master of Engineering (M.Eng.) All programs are fully accredited by the Ontario Council of Graduate Studies.

1. GRADUATE RESEARCH PROGRAMS

The M.E.Sc. program is structured to assist high achieving students in acquiring specialized knowledge and to train them in research and development techniques. The objective of this program of study is to introduce the student to research and to permit some modest degree of specialization in the chosen field. The requirements for completion of the program are four half courses, through specialist training by the thesis supervisor, by attendance at research seminars and through preparation and successful Master's thesis defense. Participation, where applicable, as a teaching assistant for the undergraduate courses adds further strength.

The Ph.D. program is structured to assist high achieving students in acquiring specialized, state-of-the-art knowledge and to train them in research and development techniques. The graduates should expect careers in academia as well as in industrial research and development organizations. Graduates are expected to develop the ability to undertake independent research, to prepare papers for publication, and to develop leading edge expertise in one specific sub discipline. Specialized training is undertaken by the professor supervising the research, in addition to other faculty members acting to advise the student. The requirements for completion of the program are a combination of formal course work (4 "half courses"), teaching assistantships, independent research, participation in research seminars, journal papers, and preparation and successful thesis defense.

The M.E.Sc. and Ph.D. programs are offered in the following subject areas:

(1) Thermo-fluids,

(2) Materials and Solid Mechanics,

(3) Automation Technologies and Systems,

(4) Mechanical Engineering.

Thermo-fluids

The *Thermo-fluids Graduate Research Program* offers training in many areas of thermodynamics and fluid mechanics including: **theoretical fluid mechanics of Newtonian and non-Newtonian flows, hydrodynamic stability, Computational Fluid Dynamics (CFD), convective heat transfer, turbulence modeling, microfluidics, energy systems** and **experimental techniques**, in additional to applications in all of the mentioned areas. Students interested in the admission to the M.E.Sc. program should have a Bachelor's degree in Engineering, or an equivalent degree, from an accredited University with a minimum A grade average. In some cases, students with a similar degree from another scientific discipline may be admitted. In exceptional circumstances, students in the final year of their undergraduate studies can be admitted into the accelerated M.E.Sc. program. Students interested in the admission to the Ph.D. program should have completed the M.E.Sc. degree. In exceptional circumstances, students can be transferred directly from the M.E.Sc. into the Ph.D. program without completing the M.E.Sc. program. All students admitted into the graduate research programs are offered full financial support.

Students registered in the Thermo-fluids M.E.Sc. graduate program must complete four graduate-level half courses, and must prepare a research thesis. The program requires approximately two years for completion. The Ph.D. program requires four additional half courses and a research dissertation, and requires approximately four years to complete. Courses available in the Thermo-fluids area are:

- MME 9617 Energy Conversion
- MME 9611 Continuum Mechanics

- MME 9613 Aerodynamics for Engineers
- MME 9614 Applied Computational Fluid Dynamics and Heat Transfer
- MME 9710 Advanced Computational Fluid Dynamics
- MME 9711 Convection Heat Transfer
- MME 9712 Experimental Measurements in Fluid Mechanics
- MME 9713 Hydrodynamic Stability
- MME 9714 Introductory Computational Fluid Dynamics and Heat Transfer
- MME 9715 Mechanism and Theory of Turbulent Flow
- CEE 9639 Viscous and Boundary Layer Theory
- MME 9724 Microfluidics and Lab-on-a-Chip
- MME 9732 Biotransport Phenomena

Students may also select elective courses offered by other research groups from the Department of Mechanical and Materials Engineering, other Departments from the Faculty of Engineering and other Faculties from the University of Western Ontario upon consultation with the advisor and approval of the MME Associate Chair Graduate.

Materials and Solid Mechanics

Materials and Solid Mechanics offers advanced research in experimental and theoretical aspects of traditional materials engineering, with specific emphasis on: **mechanical properties, microstructural characterization, nano-structured materials, materials modeling, microfabrication methods, electroactive materials, MEMS, and mechanics at small scales**. Students interested in the admission to the M.E.Sc. program should have a Bachelor's degree in Engineering, or an equivalent degree, from an accredited University with a minimum A grade average. In some cases, students with a similar degree from another scientific discipline may be admitted. In exceptional circumstances, students in the final year of their undergraduate studies can be admitted into the accelerated M.E.Sc. program. Students interested in the admission to the Ph.D. program should have completed the M.E.Sc. degree. In exceptional circumstances, students can be transferred directly from M.E.Sc. into Ph.D. program without completing the M.E.Sc. program. All students admitted into the graduate research programs are offered full financial support.

Students registered in the Materials and Solid Mechanics graduate program must complete four graduate-level half courses, and must prepare a research thesis. The program requires approximately two years for completion. The Ph.D. program requires four additional half courses and a research dissertation, and requires approximately four years to complete. Courses available in the Materials and Solid Mechanics areas are:

- MME 9611 Continuum Mechanics
- MME 9612 Finite Element Methods
- MME 9616 Composite Materials
- MME 9618 Fracture of Materials
- MME 9619 Fundamentals of MEMS and NEMS
- MME 9620 Nanomaterials and Nanotechnology
- MME 9624 Modelling and Interfacing of sensors and actuators
- MME 9716 Mechanics of Thin Films
- MME 9717 Deformation of Polymers
- MME 9719 Microstructure of Polymers
- MME 9720 Strengthening Methods in Materials
- MME 9721 X-ray Diffraction in Engineering
- MME 9722 Fuel Cell Science and Engineering
- MME 9725 Piezoelectric Materials
- MME 9726 Advanced Nanomaterials

Students may also select elective courses offered by other research groups from the Department of Mechanical and Materials Engineering, other Departments from the Faculty of Engineering and other Faculties from the University of Western Ontario upon consultation with the supervisor and approval of the MME Associate Chair Graduate.

Automation Technologies and Systems

The *Automation Technologies and Systems Graduate Research Program* offers interested students the opportunity to investigate novel techniques, devices and systems to address challenging problems related to **automation technologies, inertial systems and control, machine vision, sensor development and micromachining**. Students interested in admission to the M.E.Sc. program should have a Bachelor's degree in Engineering, or an equivalent degree, from an accredited University with a minimum A grade average. In some cases, students with a similar degree from another scientific discipline may be admitted. In exceptional circumstances, students in the final year of their undergraduate studies can be admitted into the accelerated M.E.Sc. program. Students interested in the Ph.D. program should have completed the M.E. Sc. degree. In exceptional circumstances, students can be transferred directly from the M.E.Sc. into the Ph.D. programs without completing the M.E.Sc. degree. All students admitted into the graduate research program are offered full financial support.

Students registered in the M.E.Sc. program must take four half courses and complete a research thesis. This program of study takes approximately two years to complete. Registrants in the Ph.D. program must take an additional four half courses and complete a dissertation based on original research. A typical Ph.D. program will require four years to complete. Graduate Courses available for the Automation Technologies and Systems Program are:

- MME 9610 Applied Measurement and Sensing Systems
- MME 9612 Finite Element Methods
- MME 9619 Fundamentals of MEMS and NEMS
- MME 9622 Advanced Kinematics and Dynamics
- MME 9624 Actuator Principles, Integration and Control (ECE 9509)
- MME 9727 Computer-Aided Design and Manufacturing
- MME 9728 Computer-Aided Geometric Modelling
- MME 9729 Optomechatronic Systems: Techniques and Applications
- MME 9730 Principles and Applications of Neural Networks
- MME 9731 Stochastic Dynamics and Stability of Mechanical Systems

Students may also select elective courses offered by other research groups from the Department of Mechanical and Materials Engineering, other Departments from the Faculty of Engineering and other Faculties from the University of Western Ontario upon consultation with the advisor and approval of the MME Associate Chair Graduate.

Mechanical Engineering

The General *Mechanical Engineering Program* offers students opportunity to follow personalized program within the general area of Mechanical Engineering. Course can be selected according to the needs of the individual program and within research areas of the Department. Three of the available research areas discussed above are complemented by **Biomechanics**, which exposes students with an opportunity for graduate level training in both in the theory and application of mechanical engineering to primarily orthopaedic and cardiovascular medicine. Students interested in the admission to the M.E.Sc. program should have a Bachelor's degree in Engineering, or an equivalent degree, from an accredited University with a minimum A grade average. In some cases, students with a similar degree from another scientific discipline may be admitted. In exceptional circumstances, students in the final year of their undergraduate studies can be admitted into the accelerated M.E.Sc. program. Students interested in the admission to the Ph.D. program should have completed the M.E.Sc. degree. In exceptional circumstances, students can transfer directly from M.E.Sc. into Ph.D. program without completing M.E.Sc. degree. All students admitted into the graduate research program are offered full financial support.

2. PROFESSIONAL DEGREE PROGRAMS

Master of Engineering, Mechanical and Materials

The Department of **Mechanical & Materials Engineering (MME)** at the University of Western Ontario offers a **Master of Engineering (M.Eng.) program in Automation Technologies and Systems**. This program is specially structured to assist qualified engineers in the advancement of their professional careers and to provide students with the skills necessary to address key technological challenges in the design, analysis and application of automation technologies and systems, primarily in manufacturing industries.

Students start this program on September 1st. Alternate start date requires the approval of the MME Associate Chair Graduate. If enrolled full-time, a student can complete the degree in one year. Some courses are offered in the evening.

For admission consideration to the M.Eng program, students must have a Bachelor's degree in Mechanical Engineering, or an equivalent degree from an accredited University with a minimum of 70% (B) grade average (North American), computed based on the last two years of a bachelor's honours degree marks, or on their previous graduate marks. In some cases, students with a similar degree from another scientific discipline may be admitted, with the approval of the MME Associate Chair Graduate. Please note that this is a very competitive program, meeting the minimum requirements for admission does not guarantee acceptance into the program.

Interested student may also be able to enroll in some 97xx-level courses offered by the MME Department with the approval of the course instructor and the MME Associate Chair Graduate. Please note that MEng students are allowed to take a maximum of 3 MME 95xx-level courses.

Courses may be chosen from Electrical and Computer Engineering, Chemical and Biochemical Engineering, Civil and Environmental Engineering, Applied Math, and Physics and Astronomy with the approval of the MME Associate Chair Graduate.

For more information please visit our website:
http://www.eng.uwo.ca/mechanical/graduate/professional_program/index.html
or contact by phone (519-661-4122) or by e-mail (mmeprofessionalgrad@uwo.ca).

Master of Engineering (M.Eng.) program in Automation Technologies and Systems

The program is comprised of either 10 half courses, or 8 half courses plus a MEng Project (MME 9600) as follows:

A) 4 core half courses in Automated Technologies and Systems.

MME 9521a	Modern Control Systems	MME 9603a	Solid Mechanics
MME 9601a	Design and Manufacturing	MME 9624a	Actuator Principles: Integration and Control

B) 2 of the 4 core half courses in Professional Engineering (offered in Summer term);

ES 9185L	Risk Assessment and Management in Engineering Systems	ES 9010L	Intellectual Property for Engineers
ES 9510L	Engineering Planning and Project Mgmt	ES 9670L	Engineering Communication

C) Elective half courses, chosen from the list below, such that the total number of courses taken is 10 (if not enrolling in the MME 9600 MEng Project), or 8 with the MEng Project.

MME 9512b	Computer Integrated Manufacturing	MME 9640b	Medical Device Design
MME 9520b	Robotics and Manufacturing Automation	MME 9654b	Applied Mechatronic Systems
MME 9527b	Advanced CAE: Reverse Engineering		

Master of Engineering (M.Eng.) program in Composite Materials

The program is comprised of either 10 half courses, or 8 half courses plus a MEng Project (MME 9600) as follows:

A) 4 core half courses related to Composite Materials.

MME 9602a	Engineering Materials	MME 9616a	Composite Materials
MME 9603a	Solid Mechanics	MME 9643b	Composite Processing

B) 2 of the 4 core half courses in Professional Engineering (offered in Summer term);

ES 9185L	Risk Assessment and Management in Engineering Systems	ES 9010L	Intellectual Property for Engineers
ES 9510L	Engineering Planning and Project Management	ES 9670L	Engineering Communication

C) 4 elective half courses (if not enrolling in the MME 9600 MEng Project), or 2 elective half courses with the MEng Project.

MME 9601a	Design and Manufacturing	MME 9620b	Nanomaterials and Nanotechnology
MME 9612b/L	Finite Element Methods	MME 9623b	Theory and Practice of Plasticity
CBE 9455	Advanced Polymerization Engineering		

Master of Engineering (M.Eng.) program in Heating, Ventilating and Air Conditioning (HVAC) Systems

The program is comprised of the following:

D) 4 mandatory core half courses related to HVAC.

MME 9516a	HVAC I	MME 9641b	Thermal Systems Engineering
MME 9517b	HVAC II	MME 9646b	Energy Modeling of Buildings

E) 2 of the 4 core half courses in Professional Engineering (offered in Summer term);

ES 9185L	Risk Assessment and Management in Engineering Systems	ES 9010L	Intellectual Property for Engineers
ES 9510L	Engineering Planning and Project Mgmt	ES 9670L	Engineering Communication

F) 4 elective half courses (if not enrolling in the MME 9600 MEng Project), or 2 elective half courses with the MEng Project.

The elective courses are chosen from the list below:

MME 9515a	Fluid Machinery	MME 9617b	Energy Conversion
MME 9524b	Pressure Vessel Design	MME 9653L	Industrial Piping System Design
MME 9604a	Fluid Dynamics	CEE 9518L	Building Information Modelling
MME 9614a	Applied Computational Fluid Mechanics and Heat Transfer		

Master of Engineering (M.Eng.) program in Mechanical Engineering

The program is comprised of either 10 half courses, or 8 half courses plus a MEng Project (MME 9600) as follows:

G) Minimum 2 of the 4 core half courses in Mechanical and Materials Engineering.

MME 9601a	Design and Manufacturing	MME 9603a	Solid Mechanics
MME 9602a	Engineering Materials	MME 9604a	Fluid Mechanics

H) 2 of the 4 core half courses in Professional Engineering (offered in Summer term);

ES 9185L	Risk Assessment and Management in Engineering Systems	ES 9010L	Intellectual Property for Engineers
ES 9510L	Engineering Planning and Project Mgmt	ES 9670L	Engineering Communication

I) Elective half courses, chosen from the list below, such that the total number of courses taken is 10 (if not enrolling in the MME 9600 MEng Project), or 8 with the MEng Project.

MME 9511b	Biomechanics of the Musculoskeletal System	MME 9616a	Composite Materials
MME 9512b	Computer Integrated Manufacturing	MME 9619b	Fundamentals of MEMS and NEMS
MME 9515a	Fluid Machinery	MME 9620b	Nanomaterials and Nanotechnology
MME 9516a	HVAC I	MME 9621b	Computational Methods in Engineering
MME 9517a	HVAC II	MME 9622b	Advanced Dynamics and Kinematics
MME 9519a	Production Management	MME 9623b	Theory and Practice of Plasticity
MME 9520b	Robotics and Manufacturing Automation	MME 9624a	Actuator Principles: Integration and Control
MME 9521a	Modern Control Systems	MME 9639b	Viscous Layer and Boundary Flow
MME 9524b	Pressure Vessel Design	MME 9640b	Medical Device Design
MME 9525a	Fundamentals of MEMS	MME 9641b	Thermal Systems Engineering
MME 9526a	Advanced CAE: Manufacturing Technologies	MME 9643b	Composite Processing
MME 9527b	Advanced CAE: Reverse Engineering	MME 9646b	Energy Modeling of Buildings
MME 9611a	Continuum Mechanics	MME 9653L	Industrial Piping System Design
MME 9612b/L	Finite Element Methods	MME 9654b	Applied Mechatronic Systems
MME 9614a	Applied Computational Fluid Mechanics & Heat Transfer		

Master of Engineering (M.Eng.) program in Materials and Solid Mechanics

The program is comprised of either 10 half courses, or 8 half courses plus an MEng Project (MME 9600) as follows:

J) 4 core half courses in Mechanical and Materials Engineering.

MME 9602a	Engineering Materials	MME 9623b	Theory and Practice of Plasticity
MME 9603a	Solid Mechanics	MME 9622b	Advanced Dynamics and Kinematics

K) 2 of the 4 core half courses in Professional Engineering (offered in Summer term);

ES 9185L	Risk Assessment and Management in Engineering Systems	ES 9010L	Intellectual Property for Engineers
ES 9510L	Engineering Planning and Project Mgmt	ES 9670L	Engineering Communication

L) Elective half courses, chosen from the list below, such that the total number of courses taken is 10 (if not enrolling in the MME 9600 MEng Project), or 8 with the MEng Project.

MME 9524b	Pressure Vessel Design	MME 9619b	Fundamentals of MEMS and NEMS
MME 9611a	Continuum Mechanics	MME 9620b	Nanomaterials and Nanotechnology
MME 9612b/L	Finite Element Methods	MME 9621b	Computational Methods in Engineering

MME 9616a	Composite Materials		

Master of Engineering (M.Eng.) program in Thermofluids

The program is comprised of either 10 half courses, or 8 half courses plus a MEng Project (MME 9600) as follows:

M) 3 core half courses in Fluid Mechanics.

MME 9604a	Fluid Mechanics
MME 9614a	Applied Computational Fluid Mechanics and Heat Transfer
MME 9515a	Fluid Machinery

N) 2 of the 4 core half courses in Professional Engineering (offered in Summer term).

ES 9185L	Risk Assessment and Management in Engineering Systems	ES 9010L	Intellectual Property for Engineers
ES 9510L	Engineering Planning and Project Mgmt	ES 9670L	Engineering Communication

O) 5 elective half courses (if not enrolling in the MME 9600 MEng Project), or 3 elective half courses with the MEng Project.

MME 9516a	HVAC I	MME 9621b	Computational Methods in Engineering
MME 9517b	HVAC II	MME 9639b	Viscous Layer and Boundary Flow
MME 9524b	Pressure Vessel Design	MME 9641b	Thermal Systems Engineering
MME 9611a	Continuum Mechanics	MME 9646b	Energy Modeling of Buildings
MME 9617b	Energy Conversion		

Master of Engineering (M.Eng.) program in **Mechanical Engineering** with an option in ***Engineering in Medicine***

For information on the program please go to http://www.eng.uwo.ca/gradstudies/future/programs/EngMed.html

3. GRADUATE ENROLLMENT

	M.Eng	M.E.Sc.	Ph.D.	Visiting	Total
Summer 2015	57	37	36	6	136
Fall 2015	82	32	41	10	166
Winter 2016	57	37	42	7	143

4. GRADUATE DEGREES GRANTED

October 2015 CONVOCATION – Mechanical and Materials Engineering					
Student Name	Degree	Completion Date	Thesis Exam Date	Supervisor/ Co-Supervisor	Thesis Title
Ajao, Adefunsho	MEng	31-Aug-15			
Arghavan, Soroush	MESc	20-Aug-15	17-Aug-15	Asokanthan, S	Dynamic stability and uncertainty quantification of Ring-based vibratory gyroscopes

Arifin, Willson	MESc	31-Aug-15	24-Aug-15	Kuboki, T	Development of Glass Fiber Reinforced Poly(3-hydroxybutyrate-co-3hydrosyhexanoate)
Avari, Hamed	PhD	07-May-15	04-May-15	Savory, E	Response of Endothelial Cells to Quantified Hemodynamic Shear
Bahrami, Soheila	MEng	31-Aug-15			
Bajwa, Angad	MEng	31-Aug-15			
Bu, Yi	MEng	31-Aug-15			
Gupta, Aashish	MEng	31-Aug-15			
Knowles, Nikolas	MESc	21-Apr-15	15-Apr-15	Ferreira, L	Osteoarthritis Induced Glenoid Morphology and Bone Quality: An Evaluation of Augmented Glenoid Components
Kusins, Jonathan	MESc	28-Aug-15	20-Aug-15	Ferreria, L/ Tutunea-Fatan, R	Experimental analysis of the parameters influencing the bone milling process
Liu, Mingzhe	MEng	31-Aug-15			
Nagendra, Karthik	MEng	31-Aug-15			Kinematic assessment of a delta robot
Rajakumar, Heygaan	MESc	23-Aug-15	06-Aug-15	Klassen, R	Thermal kinetics of ion irradiation hardening in selected alloys for the Canadian Gen. IV nuclear reactor
Singh, Manpuneet	MEng	31-Aug-15			
Sudhakar, Sharanjith	MEng	31-Aug-15			
Sudheer, Surene	MEng	31-Aug-15			
Sun, Yu	MEng	31-Aug-15			
Yang, Zhaoliang	MESc	26-Jun-15	29-May-15	Yang, J	Studies of Periodic and Quasiperiod Gold Nanohole Arrays and Their Applications
Zhai, He	MEng	31-Aug-15			
Zhang. Ziyu	MEng	31-Aug-15			
Zhong, Mingheng	MEng	31-Aug-15			

June 2016 Convocation – Mechanical and Materials Engineering					

Abbasi, Sayyam	MEng	30-Apr-16			
Aggarwal, Tushar	MEng	31-Dec-15			
Ahmed, Obaid	MEng	31-Dec-15			
Bachhal, Mandeep	MEng	31-Dec-15			
Bi, Ran	MEng	30-Apr-16			
Bian, Bin	MESc	01-Oct-15	23-Sep-15	Yang, J	Application of 3D Printing Technology in Porous Anode Fabrication for Enhanced Power Output of Microbial Fuel Cells
Brar, Jaskirat Singh	MEng	31-Dec-15			
Cai, Jinglei	MEng	30-Apr-16			
Cao, Haonan	MEng	30-Apr-16			
Chen, Shuang	MEng	31-Dec-15			
Chen, Xing	MEng	31-Dec-15			
Chokshi, Nipam	MEng	30-Apr-16			
Csernyei, Christopher	MESc	27-Apr-16	20-Apr-16	Straatman, A.G.	Numerical Modelling of a Rotary Cement Kiln with External Shell Cooling Fans
Gill, Gulshan Singh	MEng	30-Apr-16			
Hoernke, Spencer	MEng	30-Apr-16			
Hu, Yue	MEng	31-Dec-15			
Islam, AZM Ariful	PhD	29-Apr-16	20-Apr-16	Klassen, R	Kinetics of Length-scale Dependent Deformation of Gold Microspheres and Micropillars
Jin, Bingkun	MEng	31-Dec-15			
Jowaheer, Abdool Aman	MEng	30-Apr-16			
Khan, Asad	MEng	30-Apr-16			
Khan, Furqan	PhD	21-Apr-16	11-Apr-16	Straatman, A.G.	A Model for Complex Heat and Mass Transport involving Porous Media with Related Applications
Kher, Dushyantsinh	MEng	31-Dec-15			
Khokhar, Sandeep	MEng	31-Dec-15			
Kollipara, Loka Abhichandra	MEng	30-Apr-16			
Konstanyinopoulos, George	MEng	30-Apr-16			
Lawes, Stephen	MESc	09-Oct-15	08-Oct-15	Sun, X	Inkjet Printed Thin Film Electrodes for Lithium-Ion Batteries

Li, Jianan	MEng	30-Apr-16			
Mann, Janmeet	MEng	30-Apr-16			
Mittal, Mohit	MEng	31-Dec-15			
Oduwole, Mosope	MEng	31-Dec-15			
Rajupt, Usman	MESc	26-Apr-16	15-Apr-14	Yang, J	Application of Natural convection to Photovoltaic Panel Cooling and Photocatalytic Disinfection
Ramadan, Abdel	MESc	14-Mar-16	02-Feb-16	Siddiqui, K	Parametric Study of Vertical Ground Loop Heat Exchangers for Ground Source Heat Pump Systems
Ramanathan, Reghu Prashanth	MEng	31-Dec-15			
Riese, Adam	MESc	06-Oct-15	24-Sep-15	Sun, X	Nanostructured Carbon Materials for Active and Durable Electrocatalysts and Supports in Fuel Cells
Rudra, Sankalp	MEng	31-Dec-15			
Sakib, Md Nazmus	MESc	11-Dec-15	04-Dec-15	Floryan, J.M	Spectially Accurate Algorithm for Flow in 3-Dimensional Rough Channels
Salazar,Eduardo	MEng	31-Dec-15			
Seddighi, Amirreza	MESc	08-Feb-16	18-Jan-16	Floryan, J.M	Flow Instability in Ribbed Annuli
Shojaei Kavan, Loabat	MEng	30-Apr-16			
Siddiqui, Zeeshan	MEng	31-Dec-15			
Singh, Gurtej	MEng	31-Dec-15			
Singh, Gurwinder	MEng	31-Dec-15			
Singh, Mandeep	MEng	31-Dec-15			
Steen, Ben	MESc	26-Sep-15	10-Sep-15	Siddiqui, K.	Investigation of flow and thermal behavior in a pipe submerged in a hot fluid
Wadkar, Abhijeet	MESc	15-Dec-15	19-Nov-15	Asokanthan, S	Simulation of magnetic field induced current and neuron spiking for magnetic seizure therapy
Wang, Hao	MEng	30-Apr-16			
Wang, Jiaxing	MEng	31-Dec-15			

Xue, Changcheng	MEng	30-Apr-16			
Zandi. Sajab	MESc	06-Oct-15	24-Sep-15	Floryan, J.M.	Flows in Vibrating Channels
Zhang, Yan Li	MEng	31-Dec-15			
Zhang, Zhouyang	MEng	31-Dec-15			
Zhou, Jianyou	PhD	16-Sep-15	08-Sep-15	Jiang, L./ Khayat, R.	Electromechanical Coupling Behaviour of Dielectric Elastomer Transducer

5. GRADUATE AWARDS

Qualified students in MESc and PhD programs have access to a financial support package, which may consist of a combination of program-based funding (e.g. from a supervisor's research grant or Graduate Research Assistantship), scholarships from the Faculty of Engineering (Western Engineering Scholarship), and income from employment (e.g. a Graduate Teaching Assistantship). This package is designed to cover a substantial portion of a student's expenses for the eligible period of funding in his/her program. To be eligible for this financial support, students must be registered full-time. Incoming students must have a minimum admission average of 78% as determined by the Faculty of Graduate Studies. Continuing students must meet the graduate program conditions for progression towards the degree, as well as a minimum requirement of 78% based on all graduate courses completed in the current program. Students in Master's Engineering (M.Eng.) program is expected to fund their own education, for example, through OSAP.

Minimum Support Level

May 1, 2015	Tuition	TA/GRA	Total/term
Canadian/Perm	$2551.61	$4,000	$6,551.61
International	$6058.27	$4,000	$10,058.27

September 1, 2015	Tuition	TA/GRA	Total/term
Canadian/Perm	$3,111.80	$4,000	$7,111.80
International	$6,798.80	$4,000	$10,798.80

January 1, 2016	Tuition	TA/GRA	Total/term
Canadian/Perm	$2,590.81	$4,000	$6,590.81
International	$6,277.81	$4,000	$10,277.81

External Scholarships

During their period of fundability, i.e., 6 terms for MESc, and 12 terms for PhD, students may apply for external scholarships for which they are eligible, such as National Sciences and Engineering Research Council (NSERC), Ontario Graduate Scholarship (OGS), and Ontario Graduate Scholarships in Science and Technology (OGSST).

Ontario Graduate Scholarship (OGS):

The Ontario Graduate Scholarship (OGS) program is designed to encourage excellence in graduate studies at the master's and doctoral levels. Each award is tenable at the Ontario University of the student's choice. The value of the OGS is $5,000 per term to be held for two or three consecutive terms. One-term awards are not granted.

Ontario Graduate Scholarships in Science and Technology (OGSST):

Master's students can receive the scholarship for a maximum of two years and doctoral students for a maximum of four years, subject to a lifetime maximum of 4 years per student. The value of this scholarship is $5,000 per term, and may be held for either two or three full terms. One term awards are not allowed. OGSST awards must be held for at least 2 full consecutive terms and are paid monthly through Human Resources.

National Sciences and Engineering Research Council (NSERC):

NSERC is the national instrument for making strategic investments in Canada's capability in science and technology. NSERC's products are innovations, scientific discoveries, and highly qualified people. NSERC's unique Industrial Postgraduate Scholarship (IPS) provides financial support for highly qualified science and engineering graduates to gain research experience in industry while undertaking advanced studies in Canada. These scholarships are aimed at encouraging scholars to consider research careers in industry where they will be able to contribute to strengthening Canadian innovation.

External Scholarships Recipients: 2015-2016

Name	Program	Award	Duration
Hamilton, Benjamin	MESc	NSERC Canada Graduate Scholarship - Masters	May 1, 2015- April 30, 2016
Hussein, Sama	MESc	Ontario Graduate Scholarship	May 1, 2015- April 30, 2016
Kalbfleisch, Alan	MESc	Queen Elizabeth II Graduate Scholarship in Science and Technology	May 1, 2015- April 30, 2016
Langford, Craig	MESc	Ontario Graduate Scholarship	May 1, 2015- April 30, 2016
Lushington, Andrew	PhD	NSERC Post Graduate Scholarship - Doctoral	May 1, 2015- April 30, 2018
Milliken, Nicolas	MESc	Queen Elizabeth II Graduate Scholarship in Science and Technology	September 1, 2015- August 31, 2016
Neuert, Mark Alan Carmine	PhD	Ontario Graduate Scholarship	May 1, 2015- August 31, 2016
Reeves,Jacob Mackenzie	PhD	NSERC Post Graduate Scholarship - Doctoral	May 1, 2015- August 31, 2017
Thabet, Ashraf	MESc	Ontario Graduate Scholarship	September 1, 2015- August 31, 2016
Zhang, Tengyuan	PhD	Vanier Canada Graduate Scholarships - NSERC	May 1, 2016- April 30, 2018

6. GRADUATE SEMINAR

Fall 2015				
Date	**Student or Guest Lecturer Name**	**Supervisor/ Co-Supervisor**	**Presentation Title**	**Seminar Facilitator**
Sept. 14	Prof. M.G. Munteanu University of Udine, Italy		Harmonic Models for Axisymmetric Structures Subjected to Non-Axisymmetric Loading	
Sept. 21	Prof. J. Johnson Department of Mechanical and Materials Engineering. Western University		Scientific Presentations: The Good, The Bad and The Ugly	

	Reeves, J.	Johnson, J.	The Effect of Material Selection and Position of Partial Joint Replacement Implants on the Contact Mechanics of the Opposing Native Cartilage: A Finite Element Study	Zhang, T.
Sept. 28	Lushington, A.	Sun, X.	Designing and Tailoring Inorganic-Organic Films for Application in Lithium Storage Materials	Elhalwagy, M.
Oct. 5	Islam, A.Z.M.	Klassen, R.	Mechanical Behaviour of Gold Microspheres at Room Temperature	Khan, I.
	Roberto, M.	Savory, E.	Laboratory Simulation of Density-Driven Downbursts	
Oct. 19	Sakib, M.	Floryan, J.M.	Spectrally Accurate Algorithm for 3-Dimensional Channel Flow	Xiao, B.
	Bashar, M.	Siddiqui, K.	Investigation of Transient Heat Transfer Process During Melting Stage of a Phase Change Material (PCM)	
Oct. 26	A.Visser, Research & Instructional Services Librarian, C.B. Bud Johnston Library		Library Database	
Nov. 2	Brooks, M.	Straatman, A.G.	Thermal Modeling of Light Armored Vehicle	Sharifi, P.
	Ali, S.	Zhang, C.	Numerical Simulation of the Effects of Rotor-Stator Spacing on the Stator Flow Field in a Transonic Aero-Engine Compressor	
Nov. 9	Prof. P. Sullivan Mechanical and Industrial Engineering University of Toronto		Aerodynamic Control for Low Reynolds Number Flows	
Nov. 16	Shao, L.	Yang, J.	Development of Miniaturized Inductive Angular Position Sensor	Li, X.
	Kilpatrick, R.	Siddiqui, K. Hangan, H.	Investigation of Flow Behaviour and Scaling Issues in Wind Tunnel Modeling for Wind Resource Assessment and Wind Farm Optimization	
Nov. 23	Prof. Q. Rahman Department of Electrical and Computer Engineering Western University		The Art of Keeping a Large Group of Students Motivated	
Nov. 30	Andrushchenko, A.	Knopf, G.	Printed Electrical Circuits on Flexible Substrates Using Graphene-Cellulose Ink	Akon, A.

Winter 2016				
Date	**Student or Guest Lecturer**	**Supervisor/ Co-Supervisor**	**Presentation Title**	**Seminar Facilitator**
Jan. 11	Bognash, M.	Asokanthan, S.	Transient Dynamics of MEMS based Switching Systems	Ali, S.
	Xiao, W.	Sun, X.	Ether-Based Electrolyte Enabled Carbon Anode Materials for Sodium-Ion Batteries	
Jan. 25	Zhang, T.	Yang, J.	High Resolution & High Performance Printed Electronics via Particle-Free Inkjet Printing	Wang, B.
	Kalbfleisch, A.	Siddiqui, K.	Bubble Size Prediction of Vertical Co-Flow in the Presence of a Mesh Bubble Breaker	
Feb. 1	Professor D. Meister John M. Thompson Chair in Engineering Leadership and Innovation Ivey School of Business Western University		Essential Leadership Skills for Engineers	
Feb. 8	Khan, MD	Klassen, R.	Micromechanics of Plasticity of Zr-2.5%Nb Alloy	Langford, C.
	Wang, B.	Sun, X. Sham, T.K.	Application of Atomic Layer Deposition in Solid-State Electrolyte for All-Solid-State Lithium-Ion Batteries	
Feb. 22	Dr. W. Lin Postdoctoral Fellow Department of Mechanical and Materials Engineering, Western University		A PostDoc's progress: Some Thoughts from a PostDoctoral Scholar	
Feb. 29	Xiao, B.	Sun, X.	Novel Surface Modification Methods on Lithium Ion Battery Cathode Materials with Improved Performance for Electric Vehicles	Anatoly, A.
	Akon, A.	Kopp, G.	Surface Pressure Distributions and Flow-Field within Separation Bubbles for Surface-Mounted Prisms	
Mar. 7	Dr. R. Divigalpitiya Product Innovation Laboratory 3M Canada		A Nano-Scale C-Coated Aluminum Foil Current Collector for High-Power Lithium-Ion Batteries	
Mar. 14	Oreskovich, C.	Savory, E.	Full Scale LES Investigation of Thunderstorm Downbursts in a Meteorological Cloud Model	Bognash, M.
	Liu, Y.	Sun, X.	Nanostructured Materials for Li Ion Batteries-Surface Chemistry of $LiFePo_4$	

Mar. 21	Khan, F.	Straatman, A.G.	Modeling of Turbulence and Turbulent Heat and Mass Transfer Inside Porous Media	
Mar. 28	Prof. K. Lamb Department of Applied Mathematics University of Waterloo		Internal Waves in the Ocean	
Apr. 4	ElHalwagy, M.	Straatman, A.G.	Dynamic Coupling of Phase-Heat and Mass Transfer in Porous Media	Lushington, A.
	Yadegari, H.	Sun, X.	Atomically Deposited Pd on Mesoporous Mn_3O_4 as Catalyst for Sodium and Lithium-Oxygen Peroxide Cells	
Apr. 11	Zhang, D.	Yang, J.	Initiator-Integrated 3D Printing in Fabrication of Ultralight-Metallic, Hierarchical Mechanical Materials	Yadegari, H.
	Hussein, Sama	Tutunea-Fatan, R.	Novel Retroflective Micro-Optical Structure for Automotive Lighting Applications	
Apr. 18	Sharifi, P.	Wood, J. Sadayappan, K.	High Pressure Die Casting of Magnesium Process-Structure-Property Relationships	Khan, F.
	Li, X.	Sun, X.	Safe and Durable High-Temperature Lithium-Sulfur Batteries via Molecular Layer Deposited Coating	

7. GRADUATE STORIES

L. Jiang

Jianyou Zhou, a PhD student under Dr. Jiang's supervision received the Chinese Government Award for Outstanding Self-Financed Students Abroad in 2016.

A.G. Straatman

Chris Csernyei was hired as an engineering consultant for Gryphon International, a large international company that designs and develops process and manufacturing plants worldwide.

O.R. Tutunea-Fatan

After successfully defending his MESc thesis in Apr. 2015, Ryan Alexander started a Design Engineer position with Multimatic, while Jonathan Kusins started a position with Baylis Medical after successfully defending his MESc thesis in Aug. 2015.

J. Yang

Tengyuan Zhang, a PhD student from Dr. Yang's lab in Mechanical and Material Engineering, recently developed a hand-writing electronics technology. A specialized pen filled with conductive nanoparticles that can be used to

draw electric circuits on plastics or phot papers quickly and with ease. The pen allows users to correct their mistakes using the erasing tip, functioning just like a regular eraser.

8. VISITING STUDENTS

Name	University	Duration
Bi,Yujing	University of Chinese Academy, China	October 1, 2015-January 31, 2017
Chimetta,Bruno	University of Campinas, Brazil	October 15, 2015-April 14, 2016
Deng,Sixu	Beijing University, China	October 1, 2015-October 31, 2017
Doerr,Dominik	Karlsruhe Inst. Of Tech, Germany	September 4, 2015-October 25, 2015
Fantino,Erika	Politecnico de Torino, Italy	August 1, 2015-November 30, 2015
Ferreira Marques,Larissa	Universidad de Sao Paulo, Brazil	February 1, 2016-June 30, 2016
Goris,Sebastian	University of Wisconson	May 25, 2015-August 31, 2015
Hohberg,Martin Heino	Karlsruhe Inst. Of Tech, Germany	November 1, 2015-December 31, 2015
Maertens,Robert	Karlsruhe Inst. Of Tech, Germany	March 1, 2015-August 31, 2015
Mousavi Khalkhali,Zeinab Sadat	McMaster University	May 1, 2015-August 31, 2015
Porto,Juliette	INP-ENSE3, France	February 4, 2015-July 31, 2015
Riester,Anja	Karlsruhe Inst. Of Tech	March 1, 2015-August 31, 2015
Schwab,Simon	Karlsruhe Inst. Of Tech, Germany	September 1, 2015-February 29, 2016
Shen,Teng	Nanjing University of Sci & Tech, China	March 15, 2016-April 30, 2017
Wu, Xin	Shanxi University	January 1, 2016 –August 31, 2016
Zhang,Jiayun	Karlsruhe Inst. Of Tech, Germany	October 1, 2015-March 31, 2016
Zhang,Xiaohui	Guangxi Normal University, China	April 1, 2015-March 31, 2016
Zhang, Wenjia	Shanxi University	January 1, 2016-August 31 2016
Zhao,Changtai	Dalian University, China	November 1, 2015-October 31, 2016

RESEARCH

1. MAJOR RESEARCH AREAS

The current graduate program in the Faculty of Engineering is fully accredited by the Ontario Council of Graduate Studies. This brief seeks to further the decentralization of the program as recommended in the previous accreditation cycle by requesting the accreditation through the departmental graduate programs. Each Department has restructured the Graduate Research Programs by focusing on the individual areas of strength. In the case of the Department of Mechanical and Materials Engineering the Master's and PhD programs comprise the following fields:

- Mechanical Engineering
- Thermofluids
- Materials and Solid Mechanics
- Automation Technologies and Systems

2. FACILITIES

Laboratory Facilities

The description of laboratory facilities is divided into sections dealing separately with each of the four research groups. Note that there may be an overlap in the facilities listed as different groups may be using the same facilities, and the individuals may be contributing to different groups. There are in excess of 30,000 sq. ft. of laboratory and office spaces for the members of the program with state of the art research infrastructure and computing facilities (PCs and Workstations).

The description of laboratory facilities is divided into sections dealing separately with each of the four research groups. Note that there may be an overlap in the facilities listed as different groups may be using the same facilities, and the individuals may be contributing to different groups.

Thermofluids Group

Experimental facilities:

- Low-disturbance wind tunnel
- Hydraulic flume
- High speed imaging system
- Thermal imaging system
- Planer PIV and StereoPIV system
- Laser Induced Florescence system
- Unique small-scale downburst outflow simulator
- Automotive cooling fan module underhood rig simulator and plenum chamber
- Unique hemodynamic flow rig
- 3-component laser Doppler velocimetry system and additional lasers
- 2D wall jet wind tunnel
- Plenum chamber airflow facility for axial flow fan testing

Micro/Nano Fluids Laboratory facilities:

- OLYMPUS IX81 Inverted Fluorescence Microscopy
- Photometrics Cascade high speed Imaging system
- Patchman NP2 Micromanipulation system

Specialized computing resources:

- 4 SUN Blade 2000 workstations and 1 SUN Ultra 60 workstation and 12 high-end, single processor PCs.
- 4 dual core PCs with 4 Gb memory each, 2 dual core PCs each with 2Gb memory, 4 single core PCs each with 2 Gb memory each, one 4-processor Compaq machine (9Gb memory), one 2-processor Compaq machine (2 Gb memory), network and printing facilities.
- Server network (2 Tb, with additional 2 Tb back-up storage) and 5 PC workstations
- Commercial CFD codes, notably FLUENT and CFX
- Portal to Sharcnet

Materials and Solid Mechanics Group

Metal Forming Laboratory:

- Four combined bending and torsion test labs
- Four beam bending labs
- Four buckling test labs
- Four Asymmetric bending labs
- Two thick cylinders testing labs
- Eight P3 Vishay strain gauge indicators
- Five PCs with windows7 and data acquisition labs
- Five variable power supplies
- Various temperature and pressure sensors
- Thick Cylinder Apparatus (no. 1)

- Thick Cylinder Apparatus (no. 2)
- Unsymmetrical Bending Apparatus (no. 1)
- Unsymmetrical Bending Apparatus (no. 2)
- Column Buckling Apparatus (no. 1)
- Column Buckling Apparatus (no. 2)
- Combined Bending and Torsion Apparatus (no. 1)
- Combined Bending and Torsion Apparatus (no. 2)

Biotechnology Research Laboratory

- Three AFMs (Dimension, Multimode, CSPM 5500)
- Olympus 1X81 Inverted Fluorescence Microscope with environmental chamber, high-speed camera (Photometrics Cascade), Micro-manipulator (Patchman NP2)
- Three optical MIcroscopes
- Two laser systems including Micropoint laser
- Varian UV-Vis spectrophotometer
- Three Ocean Optics spectrometers
- Probe station for MEMS and Microelectronics
- Dimatix materials printer DMP-2800
- Acoustic Measurement System
- Hot-embossing lithography
- Spin coater
- Six high-precision multi-channel pumps
- High-speed centrifuge
- Electrochemistry station
- Furnace
- Oven
- Water bath and shaken water bath
- Fume hood
- Two Biological Safety Cabinets
- Cell culture room

Heat Treating Laboratory:

- Megatronic e42wri quartz quad elliptical radian heating furnace model 30393-2 with controller
- Lindberg blue box furnace maximum temperature 1100 degree centigrad serial no x01f313762xf
- Lindberg box furnace maximum temperature 1100 degree centigrad model no 59545
- Lindberg box furnace maximum temperature 1200 degree centigrad model no T51333
- Lindberg tube furnace maximum temperature 1200 degree centigrad
- 6 thermolyne tube furnaces model 21100 maximum temperature 1200 degree centigrad
- Lindberg tube furnaces model 55035a maximum temperature 1100 degree centigrad
- Hardness testing
- Vickers pyramid hardness tester serial no 255032
- Clark rockwell type hardness tester model c8a 50340
- Clark rockwell type hardness tester model c8a
- 3Macromet rockwell type hardness tester
- Satec Impact tester model Si-1B

Composite Fabrication Laboratory:

- Freezer
- oven,
- autoclave and heated platen press for two- and three-dimensional wet lay-up and prepreg processes.

Nanomaterials Fabrication and Characterization Laboratories:

- Chemical Vapour Deposition and sputtering facilities
- Inverted Fluorescence Microscopy
- NanoScope V MultiMode SPM
- Photometrics Cascade high speed Imaging system

- Patchman NP2 Micromanipulation system
- Cell Culture Room
- Photonic Instrument
- MicroPoint Laser System
- Fuel Cell station
- High-resolution scanning
- Electronic Microscope (Hitachi 4800)
- Environmental scanning
- Electronic Microscope(Hitachi 3400N)
- Transmission Electronic Microscope (Hitachi 7000)
- Raman Spectrometer (HORIBA)
- Scientific LabRam
- Micromeritics Tristar II
- Nicolet 380 FTR

Equipment for Electrochemical Characterization/Analysis

- Hot presser
- Potentiostat/Galvanostat (autolab)
- Electrochemical station (CHI)
- Fuel Cell test station
- Glove box
- Potentiostat/Galvanostat/EIS (VMP3)
- Batteries test station (Arbin BT2000)

Mechanical Testing Laboratories

- Mechanical and servohydraulic load frames ranging from 1kN to 500kN capacity
- Variety of fixtures for compression, flexure shear and mixed-mode bending
- Instron 9250HV instrumented drop tower for moderate rate impat testing up to 1600J
- Grindosonic ultrasonic modulus measurement device

Properties of Materials Laboratory

- Shopcraft bench grinder
- Unitek spot welder model 113203
- Atlas 6 inch lathe
- Drill press canadian blower co size 18
- Drill press rockwell beaver
- Oliver rolling mill
- Imptech C-10 Cut off Machine (5 year)
- Carver press model C-24,000 lbs, 11 metric tons

Polymer Engineering Laboratory

- FTIR, micro-indenter (DMTA, deep penetration)
- thin film tensile tester
- grad student desks

Tribology Laboratory

- A variety of wear testing machines including a Plinth and a Direct Observation Wear Machine.
- High-temperature nanodindentation testing machine (Micro Materials Ltd)

Materials Characterization Laboratories

- Optical and Electron microscopy
- X-ray diffractometer
- Differential scanning calorimeter
- Electrical resistivity (4-300K),
- “Grindosonic” ultrasonic probe
- High-temperature nanoindentation

Optical Microscopy Laboratory

- Buehler micromet automatic polishers 2
- Leitz stereo microscope
- Unitron stereo microscope
- Olympus stereo microscope
- Leitz aristophot
- Reichert bench type microscope with micro hardness tester 005 263
- Olympus bh2 microscope
- Sony monitor pvm 1340
- Sony video printer up850
- Microscope video black and white camera dage mti nc65
- Leitz laborlux microscope
- Fibre optics light source intralux 150 watt
- Technical copy stand TCI
- Clemex Vision Pe Image Analyzer
- Microscope xillix digital camera 0042
- Leitz microscope with discussion attachment model laborlux (2)
- Wild stereo microscopy with discussion attachment
- Unitron metallurgical inverted microscope model mec (2)
- Wild metallurgical inverted microscope model m50 (6)
- Microgram atic balance maximum 19 grams 5 decimal places resolution
- Sartorius digital micro balance maximum 120 grams 4 decimal places resolution
- Sartorius micro balance 160 grams maximum
- Metler micro balance model p1200n
- Leitz Laborlux Microscope

Polymer Engineering Laboratory

- DSC
- DMTA
- thin film/microprobe dielectric spectrometer
- Brabender high shear mixer
- Centrifuge
- annealing ovens
- thin film spinner
- grad student desks

Equipment for Synthesis of Nanomaterials

- Direct liquid injection CVD
- Aerosol-assisted CVD
- Rapid thermal CVD
- Joule-heating CVD
- Plasma-Enhanced CVD
- Microwave-assisted hydrothermal oven
- Atomoic layer depsotio (ALD)
- Ball milling machine
- Laboratory ovens

In addition to the departmental facilities, faculty and students in the Materials and Solid mechanics group have access to the following major equipment and common facilities:

Fraunhofer Project Centre

- 2500 tonnes press
- Direct SMC
- 2 extruder configuration (Dieffenbacher process)
- High pressure RTM

The Automation Technologies and Systems Group

Dynamic and Sensing Systems Laboratory

- Vibration transducers
- Micron-scale and macroscopic vibration transducers
- Electro-dynamic shakers
- Real-time signal analyzers and modal analysis software
- Real-time control hardware/software
- Accelerometers,
- Precision rate table and controller for angular rate characterization
- Power amplifiers/conditioners for structural vibration measurement

CNC Machining Laboratory

- The Fadal 4020-5 Axis CNC Machine with tooling package.
- Tormach three-axis compp0uter numerically controlled mills
- The "Swift" DEA-Coordinating Measuring machine with Controllers and PC-Pentium I-120 MHz and "Tutor" Software.
- PC-Pentium III-350 MHz with "Surfcam 99" CAD/CAM Package
- PC-Pentium II-233 MHz with "Surfcam 99" CAD/CAM Package
- Techno Isel, 3-Axis CNC Machine with Mac 200 Controller, connected to a Pentium 150 MHz Computer System
- Dyna Myte Model 2400, 3-Axis CNC machine with optional rotary axis, connected to a Pentium 150 MHz Computer System
- 40" LCD screen for demonstration and presentation purposes
- NextEngine 3D laser scanner (2)
- Makerbot Replicator 2 x 3D printer (2)

Geometric Modeling & Virtual Sculpting Laboratory

- Immersion MicroScribe G2 hardware/software
- PHANTOM Omni haptic device
- VRMesh 3.5 Studio software
- Claytools for Rhino modeling software
- Rhino3D NURBS modeling software
- Matlab tools

Bioelectronics and Biosensor Laboratory: (Note: This laboratory contains equipment not readily available elsewhere on campus)

- Optical Bench (2 types) – including various optical breadboards and plates
- Micralyne biochip toolkit
- Optikon High-Speed Sensicam VGA cooled color digital CCD camera
- Tunable ArKr laser system
- Argon-Ion laser (457nm)
- He-Ne yellow laser (594nm)
- Infiniium oscilloscope (2GSa/s)
- Wavestar U spectrometer
- Broadband amplitude modulator (3 units)
- Electro-optical modulator and drivers (2 units)
- Acousto-optic deflector and driver
- Radiometer ION 450
- Linear and rotational precision stages (multiple)

Visualization and Virtual Reality Laboratory:

- Cyberware 3D RGB head & shoulder scanner

- Fakespace Immersadesk R-2 virtual reality display

Sensing and Mechatronic Systems Laboratory:

- Active modular omnidirectional vision systems with multiple Firewire cameras
- Modular sensor/actuator building blocks

Biomechanics Group

The Jack McBain Biomechanical Testing Laboratory:

The Biomechanical Testing Laboratory primarily conducts experimental in vitro research related to orthopaedic biomechanics. The current lab (660 sq. ft) BioHazard Level 1 facility is equipped to conduct both experimental testing and computational modelling. The focus includes orthopaedic implant fixation and implant design for the upper limb and spine, as well as the assessment of lower limb impact injury. The primary equipment available includes two Instron materials testing machines, one of which is tension-compression and the other which has three actuators (tension-compression, as well as 2 torque axes). Data acquisition is achieved through National Instruments hardware and custom-written LabVIEW software, Solidworks, Mimics, FEA software (Abacus, Truegrid) LS-DYNA).

- Finite Element analysis workstations
- Strain gauges and circuitry
- IEEE 1394 (firewire) camera
- Digital microscribe

The Wolf Biomechanics and Imaging Laboratories:

The two facilities described below conduct basic and clinical biomechanics research into in vivo human motion in health, sport, disease (primarily osteoarthritis, ligament and other soft tissue injuries) and the result of surgery, bracing and other clinical interventions. Primarily studied is the lower limb, but research is being conducted on spine and upper limb biomechanics as well.

The Wolf Orthopaedic Biomechanics Lab (WOBL) is located adjacent to the Fowler-Kennedy Sports Medicine Clinic. Composed of an 8-camera motion analysis system (Motion Analysis Corp, Santa Rosa, CA, USA), a floor-mounted forceplate (AMTI, Amherst, NY, USA) and a telemetric electromyography system (Telemyo, Noraxon, MA, USA). This facility is one of only eight in Canada.

The Wolf Orthopaedic Quantitative Imaging Lab (WOQIL) is located immediately adjacent to WOBL. The WOQIL is equipped with 2 x-ray fluoroscopes (Siremobil Compact-L C-arm, Siemens Inc, Mississauga, ON), a 4-camera motion analysis system (Motion Analysis Corp, Santa Rosa, CA, USA) and a forceplate instrumented treadmill (Kistler Gaitway, Amherst, NY, USA). This facility is unique in Canada and one of only 3 worldwide. This facility is developing the technique of dynamic radiostereometric analysis (RSA).

Both of these facilities are located within the Fowler Kennedy Sport Medicine Clinic and tests clinical patients as part of their standard care by primary care physicians, orthopaedic surgeons and physiotherapists. This arrangement is unique in Canada.

The facilities have desktop computers for 8 graduate students or research assistants and are equipped with wireless networking for additional use of student laptops (table space is available for up to 3 laptops). This has been recently expanded with external funding from a national agency. There are no plans in the next 3 years to expand further, but expansion is possible in the longer term into the adjacent Zimmer Conference room (3M bldg).

The Bioengineering Research Laboratory

The Bioengineering Research Laboratory of the Hand and Upper Limb Centre is located in Lawson Health Research Institute of St. Joseph's Health Care London. The proximity of this laboratory to the outpatient clinics, therapy department and operating rooms allows a close interaction between researchers, clinicians and patients. This has resulted in a fertile environment for our graduate and medical students, and residents who have been stimulated by the clinical correlations of their research. All surgeries are conducted by Dr. King (PI) with surgical

fellows and residents, and all engineering components are managed by Dr. Johnson (co-applicant), research engineers and graduate students.
The electromagnetic tracking device has six sensors and is linked to LabView on a personal computer. We have recently developed “Motion Station”, a Lab View based program that provides a real-time graphical description of bone and joint motion. We have access to advanced imaging facilities in house.

A sample of equipment is as follows:

- Instron materials testing machine
- Elbow testing simulator
- Shoulder testing system
- Wrist testing system
- Data Aquisition Systems (HP)
- LabView virtual instruments (HP)
- 20 PTOtrack 3D tracking systems (Norther Digital)
- Flock of Birds Magnetic tracking system
- Tekscan pressure measurement system

Surgical Mechatronics

- 500 sq. ft. laboratory located in Lawson Health Research Institute
- 460 sq. ft surgical skills laboratory (adjacent to main lab) for cadaveric testing
- KUKA 4+ robot 7-axis (6+1 independent)
- Four PC workstations (4GB RAM0
- Two Optotrack Certus 6-degree-of-freedom optical motion tracking systems (NDI, Waterloo)

3. RESEARCH SUPPORT

2015/2016	Sum of AY Award
Association/Institute/Society	$79,100.00*
Government	$2,468,782.00
Federal	$2,354,782.00
Provincial – Ontario	$114,000.00
Industry	$222,613.66
Private Donation	$40,000.00
Grand Total	$2,810,495.66
*this includes $50,639.18 of internal UWO funding	

4. RESEARCH IN THE NEWS

R. Klassen

One article in Western News RE consulting work done for MTO on the failed TransCabada Highway bridge crossing the Nipigon River. http://news.westernu.ca/2016/01/researchers-investigating-nipigon-river-bridge-failure/

A.Price

Dr. Aaron Price's efforts to discover new smart materials for biomechatronic systems are featured in the Canadian Society of Mechanical Engineering Fall 2015 Bulletin.

X. Sun

Published on "Nano Letters" and highlighted in various medias [Impact factor13.77]:Safe and Durable High-Temperature Lithium–Sulfur Batteries via Molecular Layer Deposited Coating(Nano Lett., 6/2016) Lithium–sulfur (Li–S) battery is a promising high energy storage candidate in electric vehicles. However, the commonly employed ether based electrolyte does not enable to realize safe high-temperature Li–S batteries due to the low boiling and flash temperatures. Traditional carbonate based electrolyte obtains safe physical properties at high temperature but does not complete reversible electrochemical reaction for most Li–S batteries. Here we realize safe high temperature Li–S batteries on universal carbon–sulfur electrodes by molecular layer deposited (MLD) alucone coating. Sulfur cathodes with MLD coating complete the reversible electrochemical process in carbonate electrolyte and exhibit a safe and ultra-stable cycle life at high temperature, which promise practicable Li–S batteries for electric vehicles and other large-scale energy storage systems.

Lithium-Sulfur Batteries Overcome Another Limitation: High Temperatures

By Dexter Johnson
Posted 24 Jun 2016 | 20:37 GMT

Image: iStockphoto

Lithium-sulfur (Li-S) batteries have been pursued as an alternative to lithium-ion (Li-ion) batteries for powering electric vehicles due to their ability to hold up to four times as much energy per unit mass as Li-ion. However, Li-S batteries don't come without some problems. For instance, the sulfur in the electrode can become depleted (http://spectrum.ieee.org/energywise/transportation/efficiency/brimstone-and-nanotech-may-boost-batteries) after just a few charge-discharge cycles, or polysulfides can pass through the cathode and foul the electrolyte (http://spectrum.ieee.org/nanoclast/transportation/advanced-cars/nanomaterials-keep-pushing-lithiumsulfur-battery-capabilities).

Another issue Li-S batteries face is the difficulty of ensuring that they operate safely at high temperatures due to their low boiling and flash temperatures. Now, researchers at the University of Western Ontario, in collaboration with a team from the Canadian Light Source, have leveraged a relatively new coating technique dubbed molecular layer deposition (MLD) (http://www.lightsource.ca/news/details/light_source_helps_development_of_safe_and_durable_hightemperature_lithiumsulfur_batteries2.html) that promises to lead to safe and durable high-temperature Li-S batteries.

This MLD technique is essentially an adaptation of the conventional atomic layer deposition (ALD) techniques that have been used to deposit thin inorganic oxide films. Where MLD departs from its predecessor is that it can incorporate organic components into the films, making it possible to create hybrid organic-inorganic thin films (http://onlinelibrary.wiley.com/doi/10.1002/adfm.201200370/abstract;jsessionid=8537E062A39365F1575AE108C4C3DE4F.f03t01). MLD is a technique that has proven itself applicable for use in energy storage systems; it provides a high level of control over film thickness and the chemical composition of the target material at a molecular scale.

In research described in the journal *Nano Letters* (http://www.nanowerk.com/nanotechnology-news/newsid=43758.php), the Canadian researchers were able to fabricate safe, high-temperature Li–S batteries on universal carbon–sulfur electrodes using an MLD alucone coating

"We demonstrated that MLD alucone coating offers a safe and versatile approach toward lithium-sulfur batteries at elevated temperature," said Andy Xueliang Sun, who led the research at the University of Western Ontario, in a press release.

Green Car Congress

Energy, technologies, issues and policies for sustainable mobility

Researchers develop safe and durable high-temperature Li-S battery with conventional C-S electrode using MLD alucone coating

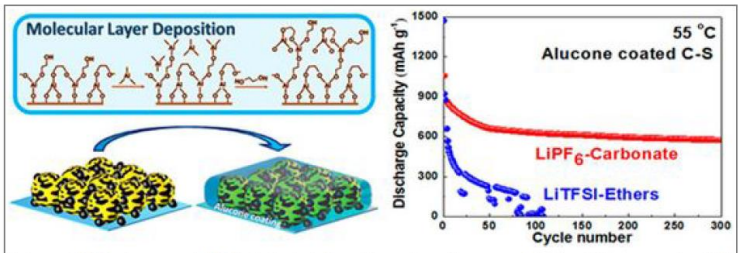
25 May 2016

Researchers from University of Western Ontario, Lawrence Berkeley National Laboratory (LBNL), and Canadian Light Sources (CLS) have developed a safe and durable high-temperature Li-sulfur battery using universal conventional carbon–sulfur (C-S) electrodes with a molecular layer deposited (MLD) alucone (aluminum oxide polymeric film) coating.

The MLD alucone-coated C–S electrodes demonstrate stabilized ultralong cycle life at high temperature (55 °C) with a capacity of more than 570 mA h g^{-1} after 300 cycles. The utilization of MLD enables the usage of conventional C-S cathode materials with carbonate-based electrolytes—a facile and versatile approach that can be applied to a variety of C–S electrodes without redesigning the carbon host materials. A paper on their work is published in the ACS journal *Nano Letters*.

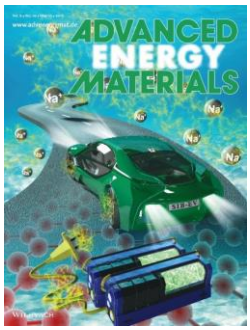
The researchers note that their current MLD alucone-coated C–S electrodes in carbonate-based electrolyte still present a number of challenges, including unsatisfactory cycle performance at room temperature. These issues are related to the limited conductivity of the MLD coating; the nanostructure of the carbon host; and the components of carbonate based solvents. Future work is aimed at addressing these issues.

Lithium-sulfur batteries are considered as highly promising candidate applied for EVs due to their high specific energy. However, a long-standing—and ignored—challenge is the safety hazard that arises when Li-S batteries operate at elevated temperature —critical in EV applications.

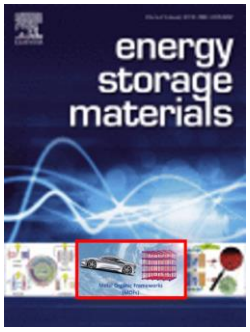


Scheme of MLD alucone-coated C-S electrode (left) and the cycle performance of stabilized high temperature Li-S batteries (right). Credit: ACS, Li *et al.* Click to enlarge.

> *State-of-art ether based electrolytes for Li-S batteries suffer from low boiling and flash points, and therefore pose significant safety risks for operation at elevated temperatures. In addition, the commonly used $LiNO_3$ additive is an oxidizing agent and provides further safety concerns. Moreover, high temperatures also promote lithium polysulfide dissolution into the electrolyte, resulting in poor cycle life. These safety concerns have considerably restricted the potential application of Li-S batteries in EVs with the use of ether based electrolyte and may involve the re-designation of sulfur cathodes in practical applications.*
>
> *One possible solution in addressing these temperature issues for Li–S batteries is revisiting the use of traditional carbonate based Li-ion electrolytes, which have been developed and adopted for lithium-ion batteries (LIBs) over three deca- des. Unfortunately, attempts in employing carbonate based electrolytes for Li–S batteries were rarely [successful] due to side reactions between carbonate solvents and electrochemical intermediates such as lithium polysulfide species,*



Highlighted by Front Cover of Journal "*Advanced Energy Materials*"*[Impact factor 15.23]*:*Recent Development and Understanding of Novel Mixed Transition-Metal Oxides as Anodes in Lithium Ion Batteries. (Adv. Energy Mater., 6/2016)*
The exploration of sodium ion batteries (SIBs) is a profound challenge due to the rich sodium abundance and limited supply of lithium on earth. Here, amorphous SnO_2/graphene aerogel (a-SnO_2/GA) nanocomposites have been successfully synthesized via a hydrothermal methods for use as anode materials in SIBs. The designed annealing process produces crystalline SnO_2/graphene aerogel (c-SnO_2/GA) nanocomposites. For the first time, the significant effects of SnO_2 crystallinity on sodium storage performance are studied in detail.



Highlighted by Front Cover of Journal "*Energy Storage Materials*":*Metal organic frameworks for energy storage and conversion (Energy Storage Materials, 2/2016)*
Metal–organic frameworks (MOFs), a novel type of porous crystalline materials, have attracted increasing attention in clean energy applications due to their high surface area, permanent porosity, and controllable structures. In this review, the recent development and understanding of MOFs and MOF-derived nanomaterials in the applications of fuel cells, batteries and supercapacitors are summarized in detail. In particular, we focus on the design and fabrication of the morphology of nanomaterials derived from MOFs and the significant impact of structure on the electrochemical performance in clean energy applications. Finally, we also present the future trends, prospects, and possible obstacles of the development of advanced MOFs and MOF-derived nanomaterials for more promising and large-scale commercial applications of clean energy.

J.. Yang

http://cen.acs.org/articles/93/web/2015/12/Sketchable-Stretchable-Circuits.html
http://news.westernu.ca/2015/07/phd-student-writing-new-circuit-solutions/
http://www.technology.org/2015/08/04/nectro-drawing-functional-electronic-circuits-by-hand/
http://technology.canoe.com/News/Features/2015/08/06/22538431.html

5. RESEARCH COLLABORATION WITH EXTERNAL PARTNERS

R.O. Buchal

Mitacs Accelerate Internship Program, Bridging the Gap – Health and Safety Engineering Student Teaching Modules – Stage 2, $10,000. The project was to develop a learning module on Safety Management Systems. The Western co-investigators were R. O. Buchal and S. Barghi. The industry partner was **Minerva Canada Safety Management.**

C.T. DeGroot

Trojan Technologies, London, ON.
Collaborating Researcher: Dr. Domenico Santoro
Work involves advising Trojan's wastewater research group on a broad range of engineering modeling topics as well as implementing modeling tools, including computational fluid dynamics simulations, to predict performance of wastewater filtration systems. This work will continue under the NSERC Collaborative Research and Development (CRD) grant that was recently awarded and will commence in September 2016.

J.M. Floryan

Erick de Moraes Franklin, UNICAMP, Brasil: Dynamics of granular media
Leandro Souza, - LMACC/SME/ICMC-USP, São Carlos - SP – Brasil: Transition in Boundary layers
Mathieu Sellier, New Zealand: Liquid Layers
M. Asai, Japan: Shear Layer Instabilities

A. Inasawa, Japan: Structured Convection
S. Gepner, Poland: Flow Dynamics in Modulated Conduits
A. Bassom, Australia: Structured convection
Yu Chen, Singapore: Turbulent Flows in Modulated Channels
Liangyu Zhao, Peoples Republic of China: Hydrodynamic Stability

L. Jiang

Dr. Jiang is collaborating with Ford Motor Company USA to conduct computational mechanics modeling on the mechanical properties of fiber reinforced composites.

G. Knopf

National Research Council of Canada
Collaborating Researchers: Drs. Suwas Nikumb and Evgueni Bordatchev (NRC, London Ont.)
Laser material processing and microfabrication
Laser material processing is a complex nonlinear process with numerous stochastic parameters related to the laser apparatus, optics, and the material specimen. Researchers at Western and the National Research Council of Canada (NRCC) have developed nonlinear models to predict the laser pulse energy requirements for micromachining and laser micro-polishing (LμP). Current research involves the development of electrically conductive graphene-based inks and novel fabrication processes for printing bioelectronic circuitry on a variety of mechanically flexible surfaces (polymers, paper, and biocompatible silk). In this work, laser microfabrication techniques are used for material removal and thermally reducing graphene-based thin films to produce conductive microcircuits. The work is supported, in part, by the Natural Sciences and Engineering Research Council (NSERC).

National Research Council of Canada
Collaborating Researcher: Dr. Evgueni Bordatchev (NRC, London Ont.)
Controlled light guidance and distribution in a flexible large area waveguides
Mechanically flexible large area polymer waveguide systems are being developed by researchers at Western and the National Research Council of Canada (NRCC).The primary function of the poly(dimethylsiloxane) waveguide system is to collect natural or artificial light over a large area (concentrator) and redirect it to the illuminating boundary region of the flexible sheet (diffuser). Photo-sensor arrays, photovoltaic cells, or illumination windows may be located at the light diffusing regions. The work is supported, in part, by the Natural Sciences and Engineering Research Council (NSERC).

Pharmax Research
Collaborating Researcher: Dr. Edward (Ted) Petroff (Pharmax Research)
Wireless biosensor for detecting sepsis in ICU catheter drainage systems
Most cases of urinary sepsis occur to patients in hospital intensive care units (ICU) or long-term care facilities. If detected early, mild forms of the bacterial sepsis can be treated with the administration of antibiotics and large amounts of intravenous fluids. However, untreated or severe sepsis has a mortality rate of nearly 50%. This collaborative research involves the design and manufacture of a novel wireless, printed bioelectronic sensor platform that is capable of detecting the early stages sepsis by monitoring the presence of bacteria in urinary catheter drainage systems. Western researchers are developing new low-cost conductive inks and inkjet printing technologies that permit the fabrication of wireless microcircuits on non-rigid substrates. Although at an early stage, this research may have a high impact on the quality of healthcare in Canada and around the world.

K. Siddiqui

Technical University of Denmark

Project: Characterization of the near-surface flow field over Bolund Island
Bolund Island is located off the cost of Denmark. The island is considered as a test side for field measurements focusing on the investigation of the near-surface flow produced by the wind approaching the island from the sea. This collaborative project with the Wind Engineering Group at the Technical University of Denmark is focused on the near-surface flow characterization over a 1/100th and 1/50th scaled model of the island in the lab (BLWTL and WindEEE) using Particle Image Velocimetry (PIV).

Wind Energy Institute of Canada (WEICan), PEI

Project: Investigation of wake and topography effects on a wind farm performance
WEICan owns and operates a wind farm in Prince Edward Island (PEI) consisting of five 2 MW wind turbines, which are grid connected. WEICan has an issue with the underperformance of a wind turbine, which is suspected to be due to local topography. This project is focused on field measurements to characterize the topography and wake effects on the wind field and wind turbine performance in a wind farm.

Line-X London Inc

Project: Thermal characterization of polyurethane-cement composites
The accumulation of snowfall and ice on driveways can pose physical and health hazards to home residents. Line-X is currently developing a novel heating system based on conductive polyurethane-cement composites as a retrofit for snowmelt applications. This project is focused on the characterization of the thermal behavior of polyurethane-cement composites.

Trojan Technologies

Project: Accelerate development of new technologies and applications for advanced water treatment

Trojan Technologies is a world leader in water treatment systems using UV light. This project is focused on the measurement and testing of a solid waste removal system at a laboratory scale.

Trudell Medical International

Project: Ventilator aerosol delivery system performance testing

Trudell Medical International develops ventilator drug delivery systems. The company found some issues in the efficient delivery of the drugs through their system. This project is focused on the diagnosis of the problems in the aerosol component of the system and its characterization.

A.G. Straatman

St. Mary's Cement - An MESc project (Chris Csernyei) was conducted with St. Mary's cement to understand the largest sources of energy waste at the plant. The project was funded initially by MITACS and then by St. Mary's cement. The project was completed in April 2016.

GDLS - An MESc project (Marc-Andre Brooks) was conducted to develop a heat transfer model to calculate the heat load on a light-armored vehicle. The project was funded by MITACS and GDLS. The project was completed in May 2016.

Vineland Research and Innovation - A project was carried out to understand the airflow characteristics of a patented Appassimento (dehydration) chamber. collaboration was with Dr. Gideon Avigad and Dr. Bernard Goyette of Vineland Research.

X. Sun

General Motors of Canada (Fuel Cell and Li Ion Batteries for Electric Vehicles): Since 2005, we have been collaborating with GM scientists to develop one-dimensional nanomaterials in fuel cell applications. Through Automobile Partnership of Canada (APC), we are working on “In Situ Studies of Electrochemical Processes in Automotive Materials” involving five research teams from McMaster University, McGill University, Univerisity of Quebec and Western, supported by GM. Recently, we successfully obtained NSERC Strategic grant in 2014, supported by GM.

Ballard Power Systems (Fuel cell studies): After an NSERC CRD and NSERC Strategic grants on carbon nanotubes as Pt catalyst support for fuel cells, recently, working on “Low Pt catalysts for PEM fuel cells research

network" – through Automobile Partnership of Canada (APC), involving 20 research teams from seven universities and NRC supported by several industrial partners such as Ballard Power Systems.

Lithium Phostech Inc. (Li Ion Batteries for Electric Vehicles): Over the past few years, there is a dramatic increase of interest in large scale batteries for energy storage, especially for the transportation sector and energy storage (smart grid). Lithium-ion battery (LIB) is one of the most promising power systems because it can offer a higher operative voltage and energy density. Recently, in collaboration with scientists in Phostech, we are working on another project titled "Scale-up of a novel melt synthesis process for manufacturing of C-$LiFePO_4$ for automotive applications' from Automobile Partnership of Canada. It deals with five research teams from University Polytechnique Montreal, University of Montreal, Western and CANMET national lab supported by Phostech Lithium Inc..

3M Canada: working with 3M Canada on NSERC Engage for LI-S batteries.

O.R. Tutunea-Fatan

Collaboration with National Research Council (R. Tutunea-Fatan and E. Bordatchev): We are working in collaboration with researchers from the National Research Council's Centre for Automotive and Surface Transportation in London to investigate multi-axis CNC laser polishing operations, in an attempt to determine correlations between process parameters and quality of the surface produced, typically characterized by an average roughness in the nanometer domain. The applications of this technology span over a broad range of engineering applications, from mold and die to biomedical industries.

Collaboration with Hand and Upper Limb Center from St. Joseph Hospital (R. Tutunea-Fatan, J. Johnson and Louis Ferreira)**:** We are working in collaboration with surgeons and researchers from the Hand and Upper Limb Centre from St. Joseph Hospital in London to develop computer assisted techniques capable to enhance the precision and efficiency of upper limb joint replacement procedures (*e.g.* elbow and shoulder). This work will translate into preoperative computer assisted software to be used for surgical simulation and training, as well as implant shape optimization purposes.

Collaboration with Active Industrial Solutions. (R. Tutunea-Fatan and E. Bordatchev): We are working in collaboration with a Canadian Windsor-based industry partner to develop and/or identify more efficient methods to fabricate automotive retroreflectors.

J. Yang

Dr. Jun Yang has been collaborating with R&D teams of **Rosstech inc. and Topnotch Building Maintenance Ltd**. to develop new technologies of printable electronics.

Dr. Jun Yang has been collaborating with R&D team of **Xerox Corporation** in 3D printing research.

Dr. Jun Yang has been collaborating with R&D team of **Marwood Metal Fabrication** to develop new coating technology.

C.Zhang

Research project with **OMTEC,** Ridgetown, Ontario. The objectives of this study are (1) to develop a computational fluid dynamics (CFD) model which could be used to predict important process parameters, such as the pressure drop due to the porous filter, at different operating conditions and (2) to investigate the effect of the geometric parameters of the coalescer and separator on the pressure drop and filtration efficacy.

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2. REFEREED CONFERENCE PROCEEDINGS

Knowles NK, Langohr GDG, Athwal GS, **Ferreira LM.** (June 2016) A Finite Element Analysis of Augmented Glenoid Components. The 2016 Annual Meeting of the Canadian Orthopaedic Association (COA). Quebec City, QC. (International) (Poster)

Knowles NK, **Ferreira LM**, Athwal GS. (June 2016). Premorbid Retroversion is Significantly Greater in Type B2 Glenoids. The 2016 Annual Meeting of the Canadian Orthopaedic Association (COA). Quebec City, QC. (International) (Poster)

West E, Knowles NK, **Ferreira LM**, Athwal GS. (June 2016). Comparison of Humeral Head Osteotomy using Anatomic and Guide-Assisted Cuts, The 2016 Annual Meeting of the Canadian Orthopaedic Association (COA). Quebec City, QC. (International) (Podium)

Knowles NK, **Ferreira LM**, Athwal GS. (June 2016) Premorbid Retroversion is Significantly Greater in Type B2 Glenoids. 2016 Summer Biomechanics, Bioengineering and Biotransport Conference. National Harbor, MD. (International) (Podium)

Knowles NK, Langohr GDG, Athwal GS, **Ferreira LM**. (June 2016) A Finite Element Analysis of Augmented Glenoid Components. 2016 Summer Biomechanics, Bioengineering and Biotransport Conference. National Harbor, MD. (International) (Poster)

Knowles NK, Carroll MJ, Keener JD, **Ferreira LM**, Athwal GS. (June 2016) A Comparison of Normal and Osteoarthritic Humeral Head Size and Morphology. 2016 Summer Biomechanics, Bioengineering and Biotransport Conference. National Harbor, MD. (International) (Poster)

West EA, Knowles NK, **Ferreira LM**, Athwal GS. (June 29 - July 2, 2016). Comparison of Humeral Head Osteotomy using Anatomic and Guide-Assisted Cuts. 2016 Summer Biomechanics, Bioengineering and Biotransport Conference. National Harbor, MD. (International) (Poster)

Knowles NK, Langohr GDG, **Ferreira LM**, Athwal GS. (May 18-20, 2016) A Finite Element Analysis of Augmented Glenoid Components. The 13th International Congress of Shoulder and Elbow Surgery. Jeju, Korea. (International) (Podium) (PhD)

West EA, Knowles NK, **Ferreira LM**, Athwal GS. Comparison of Humeral Head Osteotomy using Anatomic and Guide-Assisted Cuts. Canadian Bone and Joint Conference. London, ON. April 8-9, 2016. (Poster)

West EA, Knowles NK, **Ferreira LM**, Athwal GS. Comparison of Humeral Head Osteotomy using Anatomic and Guide-Assisted Cuts. London Health Research Day. London, ON. March 29, 2016. (Poster)

Knowles NK, Langohr GDG, **Ferreira LM,** Athwal GS. (March 2016) A Finite Element Analysis of Augmented Glenoid Components. 2016 Annual Meeting of the American Academy of Orthopaedic Surgeons (AAOS). Orlando, FL. (International) (Poster) (PhD)

Knowles NK, Langohr GDG, **Ferreira LM**, Athwal GS. (March 2016) A Finite Element Analysis of Augmented Glenoid Components. American Shoulder and Elbow Surgeons Open Meeting. Asheville, NC. (International) (Podium) (PhD)

Knowles NK, Langohr GDG, **Ferreira LM,** Athwal GS. (October 2015) A Finite Element Analysis of Augmented Glenoid Components. American Shoulder and Elbow Surgeons Closed Meeting. Asheville, NC. (International) (Podium) (PhD)

Knowles NK, **Ferreira LM**, Athwal GS. (September 2015). Premorbid Retroversion is Significantly Greater in Type B2 Glenoids. Computer Methods in Biomechanics and Biomedical Engineering & Imaging and Visualization. Montreal, QC. (International) (Poster) (PhD)

Knowles NK, Langohr GDG, **Ferreira LM,** Athwal GS. (September 2015) A Finite Element Analysis of Augmented Glenoid Components. Computational Methods in Biomechanics and Biomedical Engineering & Imaging and Visualization. Montreal, QC. (International) (Podium) (PhD)

Knowles NK, Carroll MJ, Keener JD, **Ferreira LM**, Athwal GS. (September 2015) Osteoarthritic Humeral Heads are Morphologically Different Than Non-Arthritic Humeral Heads. Computational Methods in Biomechanics and Biomedical Engineering & Imaging and Visualization. Montreal, QC. (International) (Podium) (PhD)

Knowles NK, Keener JD, **Ferreira LM,** Athwal GS. (September 2015) Regional Bone Density Variations in Osteoarthritic Glenoids: A Comparison of Symmetric to Asymmetric (Type B2) Erosion Patterns. Computational Methods in Biomechanics and Biomedical Engineering & Imaging and Visualization. Montreal, QC. (International) (Podium) (PhD)

Knowles NK, Keener JD, Athwal GS, **Ferreira LM.** (September 2015) Quantification of the Position, Orientation and Surface Area of Posterior Bone Loss in Type B2 Glenoids. Computational Methods in Biomechanics and Biomedical Engineering & Imaging and Visualization. Montreal, QC. (International) (Podium) (PhD)

Knowles NK, **Ferreira LM**, Athwal GS. (September 2015) A Comparison of Augmented Glenoid Component Designs for Type B2 Erosions: Evaluation by Volume of Bone Removal, and Quality of Remaining Bone. Computational Methods in Biomechanics and Biomedical Engineering & Imaging and Visualization. Montreal, QC. (International) (Podium) (PhD)

“Design of Channel Topography Suitable for Generation of Streamwise Vortices” by **J.M. Floryan** and H.V. Moradi. Proceedings of FLUCOME 2015, Nov. 15-18, 2015, Doha, Qatar.

“Experimental Study of Flow in a Channel with a Periodically Heated Wall” by A. Inasawa, K. Taneda and **J.M. Floryan.** Bul. Amer. Phys. Soc., v. 60, # 21, 2015.

“On the Analysis of Flows in Vibrating Channels” by S. Zandi, A. Mohammadi & **J.M. Floryan**. Bul. Amer. Phys. Soc., v. 60, # 21, 2015.

“Linear stability analysis of flows in a grooved channel” by A. Mohammadi & **J.M. Floryan**. Bul. Amer. Phys. Soc., v. 60, # 21, 2015.

“On the Instability of Flow in a Grooved Channel” by A. Mohammadi & **J.M. Floryan**. Proceedings of the 15th European Turbulence Conference, Aug. 25-28, Delft, Netherlands.

“On the nonlinear evolution of Gortler vortices by the presence of pressure gradient” by J. K. Rogenski, **J. M. Floryan** and L. F de Souza. Proceedings of the 23rd ABCM International Congress of Mechanical Engineering - COBEM2015, Dec. 6-11, 2015, Rio de Janeiro, Brasil.

“Characteristics of new mode of instability in a channel with longitudinal grooves” by A. Mohammadi and **J.M. Floryan**. Proceedings of the 25th CANCAM, London, Ontario, Canada, May 31 – June 4, 2015.

“Spectral Algorithm for Linear Stability Analysis of Flow in Ribbed Annuli” by H.V. Moradi and **J.M. Floryan**. Proceedings of the 25th CANCAM, London, Ontario, Canada, May 31 – June 4, 2015.

“Thermal drift due to modulated dual heating” by M.Z. Hossain and J.M. Floryan. Proceedings of the 25th CANCAM, London, Ontario, Canada, May 31 – June 4, 2015.

“Three-dimensional spectrally-accurate algorithm for the Navier-Stokes equations” by Md. Sakib and **J.M. Floryan**. Proceedings of the 25th CANCAM, London, Ontario, Canada, May 31 – June 4, 2015.

“Spectral Algorithm for Analysis of Flows in Vibrating Channels” by S. Zandi, A. Mohammadi and **J.M. Floryan**, Proceedings of the 25th CANCAM, London, Ontario, Canada, May 31 – June 4, 2015.

"A Study of Mixed Convection in a Heated Channel" by M.Z. Hossain and **J.M. Floryan**. Bul. Amer. Phys. Soc., v. 58, # 20, 2014.

"A Study of Laminar Drag Reducing Grooves" by A. Mohammadi and **J.M. Floryan**. Bul. Amer. Phys. Soc., v. 58, # 20, 2014.

"Effects of Longitudinal Grooves on the Stability of Channel Flow" by H. V. Moradi and **J.M. Floryan.** Bul. Amer. Phys. Soc., v. 58, # 20, 2014.

"Stability of flow in a channel with drag reducing grooves" by H. V. Moradi and **J.M. Floryan.** Proceedings of the IUTAM Symposium on the Laminar-Turbulent Transition, Sept. 8-11, 2014, Rio de Janeiro, Brasil. (Procedia IUTAM 14, 2015, 147-151).

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Khayat R.E, Daniel Stranges, Khorasany R., Niknami, M. and Ostoja-Starzewski, M. Fast thermal convection. A non-Fourier perspective 11th International Workshop on Subsecond Thermodynamics (Cracow, Poland June 2016)

Albaalbaki, B., **Khayat, R. E.** & Ahmed, Z. U. 2016 Thermal convection of Phan-Thien-Tanner fluids. In Proceedings of the Canadian Society of Mechanical Engineering forum. University of British Columbia Okanagan, Kelowna, BC.

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Khayat, R.E. Free-surface Jet Flow Near Channel Exit at Moderate Reynolds Number Bifurcation Instability Fluid Dynamics (Paris, July 2015)

A. Khalili, M. Yari, **R. Klassen**; "Nano-mechanical Behaviour and Microstructure of Boride Layers Formed on Inconel 718 before and after Aging", Contributed paper in Symposium: Boron, Boron Coatings, Boron Compounds and Boron Nanomaterials: Structure, Properties, Processing, and Applications, Materials Science & Technology 2016 Conference, Oct. 23 – 27, Salt Lake City, UT, USA.

M. Haghshenas, M. Gharghouri, V. Bhakhri, **R.J. Klassen,** A.P. Gerlich; "Residual stress in the friction stir processing of an Al–Zn–Mg–Cu alloy: Neutron Diffraction and Instrumented Nanoindentation measurements", 54th Annual Conference of Metallurgists (COM 2015) - hosting AMCAA - America Conference on Al Alloys, August 23-26 2015, Toronto, Canada.

V. Bhakhri, M. Haghshenas, R. Oviasuyi, **R.J. Klassen**; "Indentation-induced Deformation Behaviour of Magnesium", 25th CANCAM Conference, May 31 – June 4, 2015 London, Canada.

H. Rajakumar, **R.J. Klassen**;" Effect of irradiation and thermal recovery on the hardness of Inconel 800H and AISI 310 alloys", 25th CANCAM Conference, May 31 – June 4, 2015 London, Canada.

AZM Ariful Islam, V. Bhakhri, **R.J. Klassen**;" Plastic deformation of gold micro spheres", 25th CANCAM Conference, May 31 – June 4, 2015 London, Canada.

R.J. Klassen, **H. Rajakumar** ;"Combined effect of irradiation and temperature on the mechanical strength of Inconel 800H and AISI 310 alloys for in-core components of a GEN-IV SCWR", 7th International Symposium on Supercritical Water-Cooled Reactors, March 15-18, 2015, Helsinki, Finland.

Knopf, G.K., Sinar, D., Andrushchenko, A. and Nikumb, S. (2016) "Flexible electrical circuits printed on polymers using graphene-cellulose inks", IEEE Int'l Symposium on Circuits & Systems, Montreal QC , May 22-25, 2016 [4 pages].

Nicholson-Smith, C., **Knopf G.K.** and Bordatchev (2016), "Controlled guidance of light through a flexible optical waveguide sheet**",** SPIE OPTO - Advanced Fabrication Technologies for Micro/Nano Optics and Photonics IX, pp. 97590C-97590C. (San Francisco, CA, Feb. 13 – 18, 2016).

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Sinar, D., **Knopf, G.K.**, Nikumb, S. and Andrushchenko, A. (2016) "Printed optically transparent graphene cellulose electrodes", SPIE OPTO - Organic Photonic Materials and Devices XVIII, pp. 974515-974515. (San Francisco, CA, Feb. 13 – 18, 2016).

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Arifin, W. and **Kuboki, T.** Effects of Thermoplastic Elastomers on Mechanical Properties of Glass Fiber Reinforced Poly(3-hydroxybutyrate-co-3-hydroxyhexanoate). Annual Technical Conference 2016 of Society of Plastics Engineers, Paper #248, 23-25 May 2016, Indianapolis, Indiana, USA.

B. Poursartip, D. Yurkewich, M.-E. LeBel, R.V. Patel, A.L. Trejos and **M.D. Naish**, "Performance Evaluation of a Sensorized Arthroscopic Grasper," ASME Dynamic Systems and Control Conference, Columbus, OH, Oct. 28–30, 2015, pp. V001T15A004

A. Shamsil, A. Escoto**, M.D. Naish**, R.V. Patel, "A Computational Model for Estimating Tumor Margins in Complementary Tactile and 3D Ultrasound Images," SPIE Medical Imaging, San Diego, CA, Feb. 27–Mar. 3, 2016, pp. 978616-1–978616-15.

F. Benjamin Holness and **A.D. Price**. "Robotic extrusion processes for direct ink writing of 3D conductive polyaniline structures," SPIE Electroactive Polymer Actuators and Devices (EAPAD) 2016, 97981G, Las Vegas, Nevada, March 2016. DOI: 10.1117/12.2205905.

A.D. Price. "Photopolymerization of 3D conductive polypyrrole structures via digital light processing," SPIE Electroactive Polymer Actuators and Devices (EAPAD) 2016, 97981A, Las Vegas, Nevada, March 2016. DOI: 10.1117/12.2205918.

Bashar, M. and **Siddiqui, K.,** "Investigation on the heat transfer enhancement in a phase change material using nanoparticles" CSME International Congress, Kelowna, June 26-29, 2016.

LoTufo, J., Hangan, H., Jubayer, C. and **Siddiqui, K**., "Near-surface field measurements of flow over an escarpment" CSME International Congress, Kelowna, June 26-29, 2016.

Bashar, M. and **Siddiqui, K.,** "Study of the melting behaviour in a PCM-based thermal energy storage" ASME-JSME-KSME Joint Fluids Engineering Conference, Seoul, Korea, July 26-31, 2015.

Kalbfleisch, A., and **Siddiqui, K.,** "Bubble size reduction using mesh bubble breakers in two-phase vertical co-flow", ASME-JSME-KSME Joint Fluids Engineering Conference, Seoul, Korea, July 26-31, 2015.

Refan, M., Hangan, H., and **Siddiqui, K**., "Physical modelling of tornado-like flow field" ASME-JSME-KSME Joint Fluids Engineering Conference, Seoul, Korea, July 26-31, 2015.

A V Singh, V Raj, Numerical studies of piezoelectric composites using NURBS for geometry and field functions , Sixth International Congress on Computational Mechanics and Simulation (ICCMS2016), June 27th 2016 – July 1st 2016, I I T Bombay, India, (Key Note Presentation).

Straatman, A. G., Dyck, N., Kalopsis, A., "Generation of simple extended porous surface expression from results of pore-level conjugate heat transfer in spherical-void-phase porous blocks," Accepted at 5th Int. Conference on Porous Media and its Application in Science and Industry, Waikoloa, Hawaii, July 2016.

El-Halwagy, M., **Straatman, A. G.,** "Towards a Dynamically Coupled-Phase Heat and Mass Exchange in Porous Media," Accepted for 24th Annual Conference of the CFD Society of Canada.

Csernyei, C., **Straatman, A. G.,** "Convective heat transfer due to multiple circular jets impinging on a large cylinder," Proceeding of CANCAM 2015, London, Canada, June 1-4.

Khan, F., **Straatman, A. G.**, "Numerical Modeling of Indirect Evaporative Cooling using a Conjugate Domain Approach," 23nd Annual Conference of the CFD Society of Canada, Waterloo, June 9-10, 2015.

Straatman, A. G., "Practical Elements of Mechanical Engineering – An enrichment to University engineering education," Proceedings of 2015 CEEA Conference, Hamilton, Canada, May 29-June 3, 2015.

P. Sharifi, Y. Fan, H.B. Anaraki, A. Banerjee, K. Sadayappan, **J.T. Wood**, (2016) "Evaluation of Cooling Rate Effects on the Mechanical Properties of Die Cast Magnesium Alloy AM60", Metallurgical and Materials Transactions A, 47(10), 5159-5168.

J. Jamali, A.H-I. Mourad, Y. Fan, **J.T. Wood** (2016) "Through-thickness fracture behavior of unidirectional glass fibers/epoxy composites under various in-plane loading using the CTS test", Engineering Fracture Mechanics, 156, 83-95.

J. Jamali, Y. Fan, **J.T. Wood**, (2015) "The mixed-mode fracture behaviour of epoxy by the compact tension shear test", International Journal of Adhesion and Adhesives, 63, 79-86.

P. Sharifi, Y. Fan, K. Sadayappan, G. Birsan, **J.T. Wood** (2015) "Process-structure-property correlations for HPDC AM60B" in Magnesium Technology 2015, 351-356

3. ORAL AND POSTER PRESENTATIONS

Buchal, R., Computer-Supported Collaborative Knowledge Building, Workshop Presented at the 2016 Society for Teaching and Learning in Higher Education (STLHE) Annual Conference, Western University, London ON, June 24, 2016.

"Design of Channel Topography Suitable for Generation of Streamwise Vortices" by **J.M.Floryan** and H.V. Moradi. Presented during FLUCOME 2015, Nov. 15-18, 2015, Doha, Qatar.

"Experimental Study of Flow in a Channel with a Periodically Heated Wall" by A. Inasawa, K. Taneda and **J.M. Floryan.** Presented during the 68th Annual DFD Meeting, American Physical Society, Nov. 23-25, 2015, Boston, USA.

"On the Analysis of Flows in Vibrating Channels" by S. Zandi, A. Mohammadi & **J.M. Floryan**. Presented during the 68th Annual DFD Meeting, American Physical Society, Nov. 23-25, 2015, Boston, USA.

"Linear stability analysis of flows in a grooved channel" by A. Mohammadi & **J.M. Floryan**. Presented during the 68th Annual DFD Meeting, American Physical Society, Nov. 23-25, 2015, Boston, USA.

"On the Instability of Flow in a Grooved Channel" by A. Mohammadi & **J.M. Floryan**. Presented during the 15th European Turbulence Conference, Aug. 25-28, Delft, Netherlands.

"On the nonlinear evolution of Gortler vortices by the presence of pressure gradient" by J. K. Rogenski, **J. M. Floryan** and L. F de Souza. Presented during the 23rd ABCM International Congress of Mechanical Engineering – COBEM 2015, Dec. 6-11, 2015, Rio de Janeiro, Brasil.

Razfar N, Reeves J, Langohr DG, Willing R, Athwal GS, **Johnson JA**. The Effect of Shoulder Humeral Component Length and Material on Bone Stresses: A Finite Element Analysis. American Academy of Orthopaedic Surgeons Annual Meeting. Orlando, Florida, March 2016. (Presentation)

Haverstock J, Langohr DG, King GJW, Athwal GS, **Johnson JA.** Elbow Motion During Daily Activity. American Academy of Orthopaedic Surgeons Annual Meeting. Orlando, Florida, March 2016. (Presentation)

Langohr DG, Haverstock J, Athwal GS, **Johnson JA**. The Daily Shoulder Motion of Healthy Subjects. American Academy of Orthopaedic Surgeons Annual Meeting. Orlando, Florida, March 2016. (Poster)

Giles JW, Langohr DG, **Johnson JA**, Athwal GS. Interactions between Reverse Shoulder Arthroplasty Implant Variables and their Effects on Muscle and Joint Load. American Academy of Orthopaedic Surgeons Annual Meeting. Orlando, Florida, March 2016. (Poster)

Giles JW, Langhor DG, **Johnson JA**, Athwal GS. The Rotator Cuff is an Antagonist Following Reverse TSA: A Biomechanical Study of Differing Implant Configurations. American Academy of Orthopaedic Surgeons Annual Meeting. Orlando, Florida, March 2016. (Poster)

Langohr DG, Haverstock J, **Johnson JA**, Athwal GS. Shoulder Arthroplasty Restores Daily Shoulder Motion Levels Similar to the Contralateral Normal Side. American Academy of Orthopaedic Surgeons Annual Meeting. Orlando, Florida, March 2016. (Poster)

Abdulla I, Langohr DG, Athwal GS, **Johnson JA**. The Effect of Neck-Shaft Angle on Joint Loads and Contact Mechanics in Reverse Total Shoulder Arthroplasty. Orthopaedic Research Society Annual Meeting. Orlando, Florida, March 2016. (Poster)

Padmore C, Stoesser H, Nishiwaki M, Gammon B, Langohr DG, Lalone EA, **Johnson JA,** King GJW. The Effects of Distal Radius Deformities on Wrist Kinematics – an In-Vitro Biomechanical Study. Orthopaedic Research Society Annual Meeting. Orlando, Florida, March 2016. (Presentation)

Stoesser H, Padmore C, Nishiwaki M, Gammon B, Lalone EA, Langohr DG, King GJW, **Johnson JA**. Carpal Kinematics During Simulated Wrist Motion. Orthopaedic Research Society Annual Meeting. Orlando, Florida, March 2016. (Presentation)

Wong MT, Langohr DG, Athwal GS, **Johnson JA**. Implant Positioning Has an Effect on Acromial Stresses in Reverse Shoulder Arthroplasty. Orthopaedic Research Society Annual Meeting. Orlando, Florida, March 2016. (Poster)

Langohr DG, Athwal GS, **Johnson JA**, Medley JB. In-Vitro Wear Simulation of Reverse Total Shoulder Arthroplasty Implants. Orthopaedic Research Society Annual Meeting. Orlando, Florida, March 2016. (Poster)

Griffiths M, Langohr DG, Athwal GS, **Johnson JA**. The Effect of Glenosphere Size on Adduction and Abduction Range of Motion in Reverse Total Shoulder Arthroplasty. Orthopaedic Research Society Annual Meeting. Orlando, Florida, March 2016. (Poster)

DeDecker SP, Langohr DG, Khayat AA, King GS, **Johnson JA.** Implications of Low Stiffness Biomaterials on Contact Mechanics of Joint Hemiarthroplasty. Orthopaedic Research Society Annual Meeting. Orlando, Florida, March 2016. (Poster)

Lalone EA, Shannon H, Deluce SR, Giles JW, **Johnson JA,** King GJW. Effect of Muscle Loading and Forearm Rotation On Radiocapitellar Joint Congruency. Orthopaedic Research Society Annual Meeting. Orlando, Florida, March 2016. (Poster)

Giles JW, Langohr DG, Athwal GS, **Johnson JA.** The Rotator Cuff is an Antagonist Following Reverse TSA: A Biomechanical Study of Differing Implant Configurations. Orthopaedic Research Society Annual Meeting. Orlando, Florida, March 2016. (Poster)

Langohr DG, Haverstock JP, Athwal GS, **Johnson JA.** Motion of Total Shoulder Arthroplasty Reconstructed Shoulders During Activities of Daily Living. Orthopaedic Research Society Annual Meeting. Orlando, Florida, March 2016. (Poster)

Haverstock JP, Langohr DG, Athwal GS, King GJW, **Johnson JA.** Motion of the Elbow During Daily Activities. Orthopaedic Research Society Annual Meeting. Orlando, Florida, March 2016. (Poster)

Reeves J, Athwal GS, **Johnson JA**. A Comparison of Double Screw vs. Quadruple Button Fixation for the Latarjet Procedure. Orthopaedic Research Society Annual Meeting. Orlando, Florida, March 2016. (Poster)

Stoesser H, Padmore C, Nishiwaki M, Gammon B, Lalone EA, Langohr DG, King GJW, **Johnson JA.** Carpal Kinematics During Simulated Wrist Motion. London Health Research Day. London, Ontario, March 2016. (Poster)

Padmore C, Stoesser H, NIshiwaki M, Gammon B, Langohr DG, Lalone EA, **Johnson JA,** King GJW. In-Vitro Investigation of the Effect of Distal Radius Malunion Wrist Kinematics. London Health Research Day. London, Ontario, March 2016. (Poster)

DeDecker SP, Langohr DG, Khayat AA, King GS, **Johnson JA.** Low Moduli (<0.250 GPa) Hemiarthroplasty Implants may restore Joint Mechanics to the Native State. The Canadian Bone and Joint Conference. London, Ontario, April 2016. (Poster)

Griffiths M, Langohr DG, Athwal GS, **Johnson JA.** Reverse Total Shoulder Arthroplasty and the Effect of Component Sizing on Range of Motion. The Canadian Bone and Joint Conference. London, Ontario, April 2016. (Poster)

Padmore C, Stoesser H, Nishiwaki M, Gammon B, Langohr DG, Lalone EA, **Johnson JA,** King GJW. A Biomechanical Study of the Malunited Distal Radius and its Effects on Carpal Kinematics. The Canadian Bone and Joint Conference. London, Ontario, April 2016. (Presentation)

Stoesser H, Padmore C, Nishiwaki M, Gammon B, Lalone EA, Langohr DG, King GJW, **Johnson JA**. Biomechanical Elevation of Carpal Kinematics During Simulated Wrist Motion. The Canadian Bone and Joint Conference. London, Ontario, April 2016. (Presentation)

Abdulla I, Langohr GD, **Johnson JA**, Giles JW, Athwal GS. The Effect of Neck-shaft Angle on Joint Loads and Contact Mechanics in Reverse Shoulder Arthroplasty. Canadian Orthopaedic Association 71st Annual Meeting/Canadian Orthopaedic Research Society 51st Annual Meeting. Quebec City, Quebec, June 2016. (Poster)

Haverstock JP, Langohr GD, King GJW, Athwal GS, **Johnson JA.** Elbow Motion During Daily Activity. Canadian Orthopaedic Association 71st Annual Meeting/Canadian Orthopaedic Research Society 51st Annual Meeting. Quebec City, Quebec, June 2016. (Poster)

DeDecker SP, Langohr GD, Khayat AA, King GJW, **Johnson JA.** The Effect of Low Moduli Biomaterials on Contact Mechanics of Joint Hemiarthroplasty. Canadian Orthopaedic Association 71st Annual Meeting/Canadian Orthopaedic Research Society 51st Annual Meeting. Quebec City, Quebec, June 2016. (Poster)

Lalone EA, Shannon H, Deluce S, Giles JW, **Johnson JA,** King GJW. Effect of Muscle Loading on Radiocapitellar Joint Congruency. Canadian Orthopaedic Association 71st Annual Meeting/Canadian Orthopaedic Research Society 51st Annual Meeting. Quebec City, Quebec, June 2016. (Poster)

Langohr GD, Athwal GS, **Johnson JA,** Medley JB. In vitro Wear Simulation of Reverse Total Shoulder Arthroplasty Implants. Canadian Orthopaedic Association 71st Annual Meeting/Canadian Orthopaedic Research Society 51st Annual Meeting. Quebec City, Quebec, June 2016. (Presentation)

Griffiths M, Langohr GD, Athwal GS, **Johnson JA**. The Effect of Glenosphere Size on Adduction and Abduction Range of Motion in Reverse Total Shoulder Arthroplasty. Canadian Orthopaedic Association 71st Annual Meeting/Canadian Orthopaedic Research Society 51st Annual Meeting. Quebec City, Quebec, June 2016. (Presentation)

Langohr GD, Haverstock, JP, **Johnson JA**, Athwal GS. Total Shoulder Arthroplasty Restores Shoulder Motion Levels Similar to the Contralateral Side. Canadian Orthopaedic Association 71st Annual Meeting/Canadian Orthopaedic Research Society 51st Annual Meeting. Quebec City, Quebec, June 2016. (Presentation)

Reeves JM, Athwal GS, **Johnson JA.** A Comparison of Double Screw vs. Quadruple Button Fixation for the Latarjet Procedure. Canadian Orthopaedic Association 71st Annual Meeting/Canadian Orthopaedic Research Society 51st Annual Meeting. Quebec City, Quebec, June 2016. (Presentation)

Ng J, Nishiwaki M, Gammon B, Athwal GS, King GJW, **Johnson JA.** The Effect of Radial Head Resection on Load Transfer in the Ulnohumeral Joint: An Experimental Biomechanical Study. Canadian Orthopaedic Association 71st Annual Meeting/Canadian Orthopaedic Research Society 51st Annual Meeting. Quebec City, Quebec, June 2016. (Presentation)

Stoesser HL, Padmore CE, Nishiwaki M, Gammon B, Langohr GD, Lalone E, **Johnson JA**, King GJW. Carpal Kinematics During Simulated Wrist Motion. Canadian Orthopaedic Association 71st Annual Meeting/Canadian Orthopaedic Research Society 51st Annual Meeting. Quebec City, Quebec, June 2016. (Presentation)

Langohr GD, Giles JW, **Johnson JA,** Athwal GS. The Rotator Cuff is an Antagonist Following Reverse TSA: A Biomechanical Study of Differing Implant Configurations. Canadian Orthopaedic Association 71st Annual Meeting/Canadian Orthopaedic Research Society 51st Annual Meeting. Quebec City, Quebec, June 2016. (Presentation)

Padmore CE, Helen Stoesser HL, Nishiwaki M, Gammon B, Langohr GD, Lalone E, **Johnson JA**, King GJW. The Effect of Distal Radius Deformities on Wrist Kinematics - An in vitro Biomechanical Study. Canadian Orthopaedic Association 71st Annual Meeting/Canadian Orthopaedic Research Society 51st Annual Meeting. Quebec City, Quebec, June 2016. (Presentation)

Lalone E, Gammon B, Willing R, Nishiwaki M, **Johnson JA**, GJW King. The Effect of Muscle Loading and Forearm Rotation on Distal Radioulnar Joint Cartilage Contact Mechanics. Canadian Orthopaedic Association 71st Annual Meeting/Canadian Orthopaedic Research Society 51st Annual Meeting. Quebec City, Quebec, June 2016. (Presentation)

R.J. Klassen; “Role of in-situ testing in understanding the mechanisms of plasticity”, **Invited lecture** presented at the In-Situ Mechanical Testing of Materials Workshop, Hamilton ON, June 6, 2016.

R.J. Klassen; “Strain rate dependent plastic deformation of sub-micron size gold samples”, **Invited lecture** presented at the 28th Canadian Materials Science Conference, Hamilton ON, June 7-10, 2016.

A. Khalili, M. Yari, **R.J. Klassen**; “Microstructure and nanohardness of boride layers formed on Inconel 718 before, during, and after aging”, presented at the 28th Canadian Materials Science Conference, Hamilton ON, June 7-10, 2016.

F. Nie and **R.J. Klassen**; “Effect of helium implantation on the rate of thermal recovery of Inconel 88h and AISI 310 alloys”, presented at the 28th Canadian Materials Science Conference, Hamilton ON, June 7-10, 2016.

M. Tawfeeq and **R.J. Klassen**; “Investigation of the effect of self-similar ion irradiation and helium implantation on the nanoindentation hardness of heat treated Inconel X750”, presented at the 28th Canadian Materials Science Conference, Hamilton ON, June 7-10, 2016.

Shui, T., Feng, S., Yuan, Z., **Kuboki, T**., and Xu, C. Novel low-pressure and low-temperature process using carboxylic acids as solvents for fractionation of cornstalk into lignin and cellulose. 65th Canadian Chemical Engineering Conference, October 4-7, 2015, Calgary, Alberta, Canada.

A.D. Price and A. Cullen. “+1 Knowledge: Fostering Engagement Through Gamification,” in session “Take a Walk on the WALS Side: Innovative Teaching in Western Active Learning Space,” 36th Annual Society for Teaching and Learning in Higher Education (STLHE), London, June 2016.

F.B. Holness and **A.D. Price**. “Progress towards the additive manufacturing of conductive polymer components,” The 8th World Congress on Biomimetics, Artificial Muscles, and Nano-Bio*, Vancouver, August* 2015. (invited)

C. Micolini and **A.D. Price**. "Identifying critical implant wear patterns via embedded smart-polymer sensor arrays" at the 2016 Canadian Bone & Joint Conference, April 2016.

F. Benjamin Holness and **A.D. Price**. “Robotic extrusion processes for direct ink writing of 3D conductive polyaniline structures,” SPIE Electroactive Polymer Actuators and Devices (EAPAD) 2016, 97981G, Las Vegas, Nevada, March 2016.

A.D. Price. “Photopolymerization of 3D conductive polypyrrole structures via digital light processing,” SPIE Electroactive Polymer Actuators and Devices (EAPAD) 2016, 97981A, Las Vegas, Nevada, March 2016.

C. Micolini and **A.D. Price**. "Elucidating implant wear mechanisms via embedded smart-polymer sensor arrays" at the 2016 London Health Research Day, March 2016.

F.B. Holness and **A.D. Price**. “Progress towards the additive manufacturing of conductive polymer components,” The 8th World Congress on Biomimetics, Artificial Muscles, and Nano-Bio*, Vancouver, August* 2015. (invited)

LoTufo, J., **Siddiqui, K.,** Jubayer, C., Hangan, H., “Full scale measurements of wind field over an escarpment in Prince Edward Island using intrusive and non-intrusive techniques”, 1000 Islands Fluid Dynamics Meeting, Gananoque, Ontario, April 22-24, 2016

Kilpatrick, R., **Siddiqui, K.,** Hangan, H., “Investigation of scaling effects on wind tunnel modeling for wind resource assessment” 1000 Islands Energy Research Forum, Alexandria Bay, New York, October 30-Nov. 1, 2015.

Parvu, D., Costache, A, LoTufo, J., Hangan, H, and **Siddiqui, K**., “The use of LiDARs in the characterization of flow fields on wind farms” 1000 Islands Energy Research Forum, Alexandria Bay, New York, October 30-Nov. 1, 2015

Kilpatrick, R., **Siddiqui, K.** and Hangan, H., “Large-scale Physical Simulation of Flow Over Complex Topography”, WindTech2015, London, ON, October 19-21, 2015

Straatman, A.G. Computational Fluid Dynamics and Conjugate Domain Modelling-Western Engineering Research Showcase, April 7, 2016

Biqiong Wang, J. Liu, B. Xiao, A. Lushington, R. Li, T-K. Sham, **X. Sun**, The Application of Atomic Layer Deposition in Lithium-Ion Batteries, 18th International Meeting on Lithium Batteries (IMLB 2016), Jun 19-24, 2016, Chicago, Illinois, USA (Poster)

Yang Zhao, A. Abdulla, X. Li, Q. Sun, Z. Song, R. Li, **X. Sun**, Metal Organic Framework derived Nanomaterials in the Application of Lithium-ion and Sodium-ion Battery, 18th International Meeting on Lithium Batteries: (IMLB 2016), Jun 19-24, 2016, Chicago, Illinois, USA (Poster)

Yulong Liu, Q. Sun, M. N. Banis, R. Li, **X. Sun**, Control of the lattice orientation and interface of $LiCoO_2$ and deposition of LiPON for all solid state batteries, 18th International Meeting on Lithium Batteries: (IMLB 2016), Jun 19-24, 2016, Chicago, Illinois, USA (Poster)

Xia Li, A.Lushington, Q. Sun, J. Liu, R. Li, and **X. Sun**, Molecular scale coating and nanoscale carbon cage confined sulfur cathodes applied in Li-sulfur batteries, 18th International Meeting on Lithium Batteries: (IMLB 2016), Jun 19-24, 2016, Chicago, Illinois, USA(Poster)

Qian Sun, H. Yadegari, R. Li, **X. Sun**, Toward a better understanding on Na-air batteries, 18th International Meeting on Lithium Batteries: (IMLB 2016), Jun 19-24, 2016, Chicago, Illinois, USA(Poster)

Biqiong Wang, J. Liu, X. Li, X. Meng, M. N. Banis, R. Li, **X. Sun**, Exploring the Applications of Atomic Layer Deposition in Conventional and All-Solid-State Lithium-Ion Batteries, Advanced Materials and In-situ Techniques for Energy Conversion and Storage, April 29th 2016 London, Ontario, Canada

Xia Li, **X. Sun**, Nanomaterials and Energy Group, Advanced Materials and In-situ Techniques for Energy Conversion and Storage, April 29th 2016 London, Ontario, Canada

Hossein Yadegari, M. N. Banis, Q. Sun, B. Wang, **X. Sun**, Sodium-Oxygen Batteries: Chemical and Electrochemical Reaction Mechanisms, International Conference on Electrochemical Energy Science and Technology (EEST2015), August 16-22, 2015, Vancouver, BC, Canada (Oral)

Yang Zhao, Xia Li, Qian Sun, Zhongxin Song, Ruying Li, Xueliang Sun, Metal Organic Framework derived Porous Carbon as Anode Materials for Lithium-ion battery and Sodium-ion Battery, International Conference on Electrochemical Energy Science and Technology 2015, August 16-22, 2015 Vancouver, Canada (Oral)

Xia Li, Andrew Lushington, Jian Liu, Ruying Li, **Xueliang Sun**, Development of Doped and Coated Cathodes for Highly Stable Li-sulfur Batteries, 2015 International Conference on Electrochemical Energy Science and Technology, Aug. 16-22, 2015

Andrew Lushington, Andrew Lushington, Jian Liu, Ruying Li, **Xueliang Sun**, Engineering Thin Films via ALD/MLD for Application in Energy Storage System, SLAC workshop, May 1st 2015 Palo Alto, USA

Andrew Lushington, Andrew Lushington, Jian Liu, Ruying Li, **Xueliang Sun**, Design and Control of Lithium Battery Interfaces Through Atomic Layer Deposition and Molecular Layer Deposition, 5th ECS Montreal Student Symposium, June 5th 2015 Montreal, Canada

Andrew Lushington, Jian Liu, Yulong Liu, Mohammad Bannis, Craig Langford, Biwei Xiao, Stephen Lawes, Kaiqi Nie, Yifan Ye, Jinghua Guo and **Andy Xueliang Sun**, Designing and Tailoring Inorganic-Organic Films for Application in Lithium Storage Materials, ALD 2015, June 29th – July 1st 2015
Portland, USA

Jian Liu, Jian Liu, Mohammad N. Banis, Biwei Xiao, Qian Sun, Ruying Li, Jinghua Guo, Tsun-Kong Sham**, Xueliang Sun,** Atomic layer deposition of sodium-containing anode and cathode materials for sodium-ion batteries, 15th International Conference on Atomic Layer Deposition, June 28-July 1, 2015
Portland, Oregon, USA (Oral)

Hamilton, B.W., Hussein, S., **Tutunea-Fatan, O.R.**, and Bordatchev, E.V., 2016, "Fabrication of Right Triangular Prism Retroreflectors Through Ultraprecise Single Point Inverted Cutting, Proceedings of ASME Manufacturing Science and Engineering Conference 2016 (MSEC 2016), Jun. 2016, Blacksburg, USA, paper MSEC2016-8715, 11 pages.

Hamilton, B.W., Hussein, S., **Tutunea-Fatan, O.R.**, and Bordatchev, E.V., 2016, "Fabrication of Right Triangular Prism Retroreflectors Through 3½½-Axis Ultraprecise Single Point Inverted Cutting," Proceedings of the CAD'16 Conference, Jun. 2016, Vancouver, Canada, pp. 246-250.

Sama, H., Hamilton, B.W., Bordatchev, E.V., and **Tutunea-Fatan, O.R.**, 2016, "Optical Performance of Right Triangular Prism," Proceedings of the Photonics North 2016 Conference, May 2016, Quebec City, Canada.

Hussein, S., Hamilton, B.W., Bordatchev, E.V., and **Tutunea-Fatan, O.R.**, 2016, "Novel Retroreflective Micro-Optical Structure for Automotive Lighting Applications," Proceedings of SAE 2016 World Congress and Exhibition, Apr. 2016, Detroit, USA, paper 2016-01-1407, 10 pages.

Bordatchev, E.V., **Tutunea-Fatan, O.R.,** and Villafuerte, J., 2016, "Applicability of Laser Polishing on Cold Spray Al Alloy SST A050," presented at the 2nd Conference on Laser Polishing (LaP 2016), Apr. 2016, Aachen, Germany.

Bhuiya, M.S.H., and **Tutunea-Fatan, O.R.,** 2015, "5D Cubic B-Spline Interpolated Compensation of Geometry-Based Errors in Five-Axis Surface Machining," Proceedings of the CAD'15 Conference, Jun. 2015, London, United Kingdom, pp. 419-424.

Mohajerani, S., Bordatchev, E.V., and **Tutunea-Fatan, O.R.**, 2015, "Current State-of-the-Art in Modeling and Simulation of Laser Polishing Process," USB Proceedings of the 25th Canadian Congress of Applied Mechanics (CANCAM 2015), Jun. 2015, London, Canada, pp. 84-87.

Hussein, S., Hamilton, B., Bordatchev, E.V., and **Tutunea-Fatan, O.R.**, 2015, "Parameter-Driven Geometric Modeling of Retroreflective Features," USB Proceedings of the 25th Canadian Congress of Applied Mechanics (CANCAM 2015), Jun. 2015, London, Canada, pp. 96-99.

Hamilton, B., Hussein, S., **Tutunea-Fatan, O.R.**, and Bordatchev, E.V., 2015, "Strategies in Single Point Inverted Cutting for Fabrication of Structured Surfaces," USB Proceedings of the 25th Canadian Congress of Applied Mechanics (CANCAM 2015), Jun. 2015, London, Canada, pp. 108-111.

Kusins, J., **Tutunea-Fatan, O.R.**, Ferreira, L., 2015, "Experimental Apparatus for Analysis of Bone Removal During Surgical Resurfacing Procedures," USB Proceedings of the 25th Canadian Congress of Applied Mechanics (CANCAM 2015), Jun. 2015, London, Canada, pp. 230-233.

4. INVITED LECTURES/WORKSHOPS

J.M. Floryan

April 2016	Cape Town University, South Africa (“On the Dynamics of Liquid Droplets in Electric Fields”).
	Stellenbosch University, Stellenbosch, South Africa (“Certain Aspects of Flows over Rough Surfaces”).
	University of Witwatersrand, Johannesburg, South Africa (“Certain Aspects of Flows over Rough Surfaces”).
	University of Pretoria, South Africa (“Certain Aspects of Flows over Rough Surfaces”).
March 2016	The 58th Workshop on “Investigation and Control of Transition to Turbulence”, Tokyo Metropolitan University, Tokyo, Japan (Plenary speaker; “Recent Progress in the Analysis of the Effects of Distributed Surface Roughness (Surface Topography) on the Laminar-Turbulent Transition”).
	Texas Tech, Lubeck, Texas, USA (Effects of Surface Topography (Surface Roughness) on the Dynamics of Shear Layers).
February 2016	Politechnika Swietokrzyska, Czestochowa, Poland (“Certain aspects of flows over rough surfaces”).

L. Jiang

June 2016	Size-dependent properties of nanostructured piezoelectric materials. (Nanjing University of Science and Technology, China)
	Exploring fundamentals of dielectric elastomers for transduction technology. (Nanjing University of Science and Technology, China)
	Continuum mechanics based modeling on mechanical and electrical properties of nanocomposites. (Nanjing University of Science and Technology, China)

Nonlinear Instability of NEM Electrostatic Switches. (Nanjing University of Science and Technology, China)

X. Sun

April 2016	"Nanostructured Materials for Batteries and Fuel Cells", CongqiangUniversity, Chongqing, China.
	"Nanostructured Materials for Energy Storage and Conversion", Kunming University of Technology, Kunming, China.
March 2016	"Nanostructured Materials for Energy Storage and Conversion", International Workshop on Energy, Marselle, France
	"Na-Air batteries: understanding of Chemistry and Rechargeability", International Battery Association conference, Nante, France
December 2015	"Na-Air batteries: understanding of Chemistry and Rechargeability", PacificChem, Hawaii, USA
September 2015	Plenary talk on "Nanostructured Materials for Energy Storage and Conversion",4th International Conference & Exhibition on Clean Energy, Ottawa, Canada
August 2015	Co-Chair organizing the international conference and ***Keynote talk on " NanoElectrode Materials for PEM Fuel Cells", 2st International Electrochemical Energy and Materials Science and Technology, Vancouver, Canada
July 2015	Keynote talk on "Design of Surface and Interface of Electrodes for High-Performance Li Ion Batteries", Chinese National Conference on Electrochemistry, Harbin, China
	"Applications of Atomic Layer Deposition for Li ion Batteries and Fuel Cells", Harbin Institute of Technology
	"Nanostructured Materials for Batteries and Fuel Cells", Chanchun Institute of Applied Chemistry, Changchun, China

J. Yang

December 2015	"Conductive Bacterial Nanowires: Fundamentals and Applications for Environmental and Energy Sustainability", Pacifichem 2015, Honolulu, Hawaii, USA
	"The next wave of additive manufacturing for the upcoming industrial revolution", University of Hawaii,
September 2015	"When Nanotechnology Meets Biology: from Fundamental Studies to Applied Research", South China University of Technology, September 14, 2015
	"Introduction to Printed Electronics Technologies", South China University of Technology, September 14, 2015
August 2015	"Cu Based Printed Electronics Technology", Institute of Chemistry, Chinese Academy of Science
	"Dust removal by a standing wave electric curtain: mechanism and application", Cage Club Student Conference, the University of Western Ontario

C. Zhang

April 2016	"CFD Simulations of Two-Phase Flows in Circulating Fluidized Beds," Xi'an Jiaotong University, Xian, China.
	"Numerical Study of the Non-Premixed Combustion Process and NOx Formation in Regenerative Industrial Furnaces", Chongqing University of Science and Technology, Chongqing, China.
July 2015	"Numerical Studies of Two-Phase Flows in Circulating Fluidized Beds," China University of Petroleum, Beijing, China.
	"Numerical Analysis of Two Phase Flow and Heat Transfer in Condensers," Chongqing University of Science and Technology, Chongqing, China.

5. TECHNICAL REPORTS

C.T. DeGroot

DeGroot, C.T., Soleymani, A., and Santoro, D., 2016, "Salsnes CFD Model Development", Technical report prepared for Trojan Technologies, London, Canada.

Hassanzadeh, M., DeGroot, C.T., Soleymani, A., Sheikholeslamzadeh, E., and Santoro, D., 2016 "Sizing Tool Development and Validation", Technical report prepared for Trojan Technologies, London, Canada.

K. Siddiqui

Siddiqui, K. "Diagnosis of the aerosol delivery system and its characterization". Technical Report for Trudell Medical International, January 2016.

6. BOOKS AND BOOK CHAPTERS

P. Kurowski: Engineering Analysis with SOLIDWORKS Simulation 2016
576 Pages, ISBN: 978-1-63057-005-7

P. Kurowski: Vibration Analysis with SOLIDWORKS Simulation 2016
346 Pages, ISBN: 978-1-63057-012-5

P. Kurowski: Thermal Analysis with SOLIDWORKS Simulation 2016 and Flow Simulation 2016
300 Pages, ISBN: 978-1-63057-011-8

7. PATENTS

L. Ferreira. Navigation by Bending Forces. International PCT patent application filed. Serial Number PCT/CA2016/050064. Priority Filing Date: 2015-02-02

PROFESSIONAL SERVICES

J.M. Floryan

President, 24th Congress of International Union for Theoretical and Applied Mechanics (IUTAM), Montreal 2016. Member of IUTAM Executive (2012-present).

President, CANCAM 2015, London, Ontario, Canada.

CSME Senior Vice President (2016-present)

Secretary of the Canadian National Mechanics Committee (IUTAM), Canadian representative for the International Union of Theoretical and Applied Mechanics (2006-present).

CANCAM Central Committee, Vice President (2015-present), member (2010-2015).

Advisory Committee of the Chengdu Green Energy and Green Manufacturing Technology R&D Center, China (2014-present).

WindEEE Research Board, UWO (2014-present).

TSFP Advisory Committee Member (International Symposia on Turbulence and Shear Flow Phenomena, 2011-present).

K. Siddiqui

Chair of Thermo-fluids Technical Committee, Canadian Society for Mechanical Engineering (CSME)

Symposium Organizer, CSME International Congress, Kelowna, June 26-29, 2016.

Symposium Organizer, ASME-JSME-KSME Joint Fluids Engineering Conference, Seoul, Korea, July 26-31, 2015.

1.REVIEW OF REFEREED JOURNALS AND BOOK CHAPTERS

R.O. Buchal

Reviewed abstracts for the Society for Teaching and Learning in Higher Education, London ON, June 21 – 24, 2016.

C.T. DeGroot

Reviewed 1 paper for Journal of Fluid Mechanics

L. Ferreira

Manuscript Reviews for the following Journals:
- Journal of Shoulder and Elbow Surgery (2 manuscript review)
- Transactions of the Society for Modeling and Simulation International (1 manuscript review)

L. Jiang

ASME Journal of Applied Mechanics
Physica E: Low-dimensional Systems and Nanostructures
Smart Materials and Structures
Journal of Mechanics of Materials and Structures
Mechanics of Advanced Materials and Structures
The Archive of Mechanical Engineering
Journal of Intelligent Material Systems and Structures.

G. Knopf

International Standards Organization (ISO) - Member of the Standards Council of Canada advisory committee (CAC) on Robots for Manufacturing Environment (TC184/SC2)

NSERC Research Tools and Instruments (RTI) Grants – Committee member (2015, 2016)

Associate Editor of Refereed Journals

International Journal of Control and Intelligent Systems (Editor: C. de Silva, UBC),
International Journal of Optomechatronics (Editor: H.-S. Cho, KIAST)

Book Reviews (Proposal and/or Complete Text)

Taylor and Francis, CRC Press (2015)

Reviewer of Refereed Journals (multiple papers reviewed for some journals)

Applied Physics Letters (AIP)
Biosensors and Bioelectronics (Elsevier)
Computer Aided Design (Elsevier)
IEEE Robotics and Automation Letters (IEEE)
IEEE Sensors Journal (IEEE)
International Journal of Advanced Manufacturing Technology (Springer)
Journal of Biomedical Optics (SPIE)
Journal of Computational and Applied Mathematics (Elsevier)
Journal of Optics and Laser Technology (Elsevier)
Journal of Physics: Condensed Matter (IOP)
Materials Chemistry and Physics (Elsevier)
Micromachines (MDPI)
Optical Engineering (SPIE)
Sensors and Actuators: B Chemical (Elsevier)
Synthetic Metals (Elsevier)

T. Kuboki

1 journal paper (Journal of Cellular Plastics)
1 journal paper (Polymer Engineering & Science)
3 journal paper (Polymer Composites)

A.Price

Reviewer for International Polymer Processing (1 paper)

K. Siddiqui

International Journal of Multiphase Flow
International Journal of Heat and Mass Transfer
Wind Engineering and Industrial Aerodynamics

A.G. Straatman

Thermal Sciences
Computers and Fluids
ASME Journal of Fluids Engineering
Numerical Heat Transfer
IQAP Reviewer for Mechanical Engineering Program at McMaster University (March 2016)

X. Sun

Review about 40-50 research papers for these scientific journals: Referee for various scientific journals such as Nature Nanotechnology

Nature Communications
Nature Materials
Journal of American Chemical Society
Adv. Materials
ACS Nano, "Angewandte Chemie International Edition
Nanotechnology
Materials of Chemistry
J. Phys. Chem.
Electrochemistry Communication
Electrochemical Solid-State Letter
Appl. Phys. Lett.
Carbon
Langumir, etc.

Associate Editor, Editorial Board of Journal of Frontier on Energy Storage, 2013-
Member, Editorial Board of Journal of ISRN Nanomaterials, 2012-
Member, Editorial Board, Journal of Material Sciences & Engineering, 2011-present
Vice President, The International Academy of Electrochemical Energy Science (IAOEES)

O.R. Tutunea-Fatan

International Journal of Advanced Manufacturing Technology
Advances in Mechanical Engineering
Journal of Engineering Manufacture
Machining Science and Technology
International Journal of Production Research
Computer-Aided Design and Applications
Measurement
The Archive of Mechanical Engineering
International Journal of Mechanical Sciences

J. Yang

Review more than 20 research papers per year for these scientific journals:

Nature Nanotechnology
Advanced Materials
ACS Nano
ACS Applied Materials & Interfaces
Lab on a Chip
Applied Physics Letter
Nanotechnology
Journal of Micromechanics and Microengineering
IEEE Transactions on Industrial Electronics
IEEE Transactions on Nanotechnology
ACS Advances
Langmuir
The Journal of Physical Chemistry
Journal of Applied Physics; Sensors & Actuators: B. Chemical
Biomedical Materials
Soft Matter
Chemical Communications
Organic Electronics
Chemistry of Materials
Environmental Science & Technology

2. REVIEW OF GRANT APPLICATIONS

S. Asokanthan

NSERC Discovery Grant

R.O. Buchal

Grant reviewer for two NSERC Discovery Grant applications.

L. Ferreira

Grant Application Reviews:
NSERC Discovery (1 review)

Lawson Health Research Institute, Internal Research Fund (Spring 2016 Competition) June 7, 2016. Primary reviewer for two applications and secondary reviewer for two applications.

Lawson Health Research Institute, Internal Research Fund (Fall 2015 Competition) Nov 24, 2015. Primary reviewer for two applications.

L. Jiang

Proposal review for The New University Researchers Start-up Program of Fonds de recherche du Québec; Mitacs Elevate research proposal review.

G. Knopf

Reviewer of Grant Applications
Canada Research Chair (Tier II, Tier I) – **Canada** (2015)
Ministry of Science, Technology and Space - **Israel** (2015)
Natural Sciences and Engineering Research Council (Strategic Grants) – **Canada** (2015, 2016)
NSERC Discovery Grant – **Canada** (2015, 2016)
Romanian Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI) **- Romania** (2015, 2016)

A. Price

Reviewer for MITACS Accelerate Grants Program (1 grant)

A.G. Straatman

NSERC Discovery Grant Applications (2)
NSERC CRD application (1)
MITACS Accelerate (1)

X. Sun

NSERC Strategic
CRD I2I
Discovery
CFI
OCE
ORF

J. Yang

Serve on NSERC-CIHR CHRP program Grant Selection Committee

Review
NSERC Discovery grant applications
NSERC Strategic grant applications
NSERC CRD grant applications
NSERC I2I applications
NSERC-CIHR CHRP applications

Review grant applications for funding agency of other countries
The Terry Fox Foundation
Khalifa University Internal Research Fund
Hong Kong Environment and Conservation Fund

C.Zhang

External Grant Reviewer: MITACS, NSERC

Reviewer for Engineering Computations
Reviewer for Computer and Fluids
Reviewer for International Journal of Heat and Mass Transfer
Reviewer for Powder Technology