

ANNUAL REPORT

July 1, 2007 to June 30, 2008

Department of Mechanical and Materials Engineering

Faculty of Engineering

The University of Western Ontario

TABLE OF CONTENTS

MESSAGE FROM THE DEPARTMENT CHAIR	3
ADMINISTRATION	4
AWARDS AND RECOGNITION	5
FACULTY MEMBERS AND ADMINISTRATIVE STAFF	6
1. FULL-TIME FACULTY MEMBERS	6
2. PROFESSORS EMERITI	11
3. ADJUNCT ACADEMIC PROFESSORS	11
4. VISITING PROFESSORS	13
5. ADMINISTRATIVE SUPPORT STAFF	14
6. TECHNICAL SUPPORT STAFF	14
UNDERGRADUATE EDUCATION	15
1. MECHANICAL ENGINEERING PROGRAM	15
2. UNDERGRADUATE ENROLLMENT	19
3. DEGREES GRANTED	19
4. UNDERGRADUATE AWARDS	19
5. DESIGN PROJECTS	23
6. EXCHANGE PROGRAMS	24
7. INTERNSHIP PROGRAM	25
8. SUMMER ENGINEERING CO-OP PROGRAM	26
9. INTERNATIONAL STUDENTS	26
GRADUATE EDUCATION	27
1. GRADUATE RESEARCH PROGRAMS	27
2. GRADUATE DEGREE PROGRAMS	29
3. GRADUATE ENROLLMENT	30
4. GRADUATE DEGREES GRANTED	30
5. GRADUATE AWARDS	32
6. GRADUATE SEMINAR	33
RESEARCH	35
1. MAJOR RESEARCH AREAS	35
2. FACILITIES	36
3. RESEARCH SUPPORT	40
PUBLICATIONS	41
1. REFEREED JOURNAL ARTICLES	41
2. REFEREED CONFERENCE PROCEEDINGS	46
3. ORAL AND POSTER PRESENTATIONS	52
4. BOOK CHAPTERS	54
5. PATENTS	54
PROFESSIONAL SERVICES	54
1. REVIEW OF REFEREED JOURNALS AND BOOK CHAPTERS	54
2. REVIEW OF GRANT APPLICATIONS	57

MESSAGE FROM THE DEPARTMENT CHAIR

Welcome to the first yearly report of the Department of Mechanical and Materials Engineering. The Department has instituted a number of changes in order to increase research intensity, build up a graduate program and improve attractiveness of the undergraduate program.

The Department offers three types of programs, i.e., (i) the undergraduate program, (ii) the graduate course based master program leading to the M.Eng. degree, and (iii) the graduate research programs leading to the M.Sc. and Ph.D. degrees.

The Department offers the Bachelor of Engineering Science Degree in Mechanical Engineering, as well as three options: Mechanical Engineering and Medicine, Mechanical Engineering and Business and Mechanical Engineering and Law. We also offer a number of Concurrent Degree programs: Mechanical Engineering and Applied Mathematics; Mechanical Engineering and Medical Biophysics; Mechanical Engineering and Computer Science. Special programs can be arranged based on individual students' interests. The current full-time undergraduate enrollment is 256 with 79 students graduating in 2008.

The Department offers an M.Eng. degree programs in Thermofluids, Materials and Solid Mechanics, Mechanical Engineering and Automation Technologies and Systems. The students have an option to convert two courses into a project. The current full-time enrolment is 256 with 79 students graduating in 2008.

The Department offers M.Sc. and Ph.D. degree programs in Thermofluids, Materials and Solid Mechanics, Mechanical Engineering and Automation Technologies and Systems. The current enrolment is 107 with 40 students graduating in 2008.

During the current year two Canada Research Chairs joined the Department: (i) a Tier II in Orthopaedics Biomechanics and (ii) a Tier II in Nanomaterials for Fuel Cells.

From July 1, 2007 to June 30, 2008 the Department enjoyed success in research productivity with the publication of 94 journal papers, 1 book chapter, and 109 conference papers. In addition, 3 patents were issued. Our faculty members were granted over \$6 million in research funding from various agencies including NSERC, CFI, CIHR and from industry.

We look forward to our continued success in the years to come.

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

ADMINISTRATION

Chair



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

519-661-2111, Ext: 88330
Office: SEB 2051
Email: mfloryan@eng.uwo.ca

Graduate Board Chair



A.V. Singh, Ph.D., P.Eng.
Professor

519-661-2111, Ext: 88321
Office: SEB 2059A
Email: asingh@eng.uwo.ca

Associate Chair, Undergraduate Affairs



A.G. Straatman, Ph.D., P.Eng.
Associate Professor

519-661-2111, Ext: 88249
Office: SEB 2069B
Email: astraatman@eng.uwo.ca

AWARDS AND RECOGNITION

W. Altahan

President's Occupational Health and Safety Award, The University of Western Ontario, April 28, 2008

C.E. Dunning

Canada Research Chair (Tier II) in Orthopaedic Biomechanics, UWO (May 2008 – April 2013)
Nominated for the R. Mohan Mathur Award for Excellence in Teaching, Faculty of Eng, UWO
Honorable Mention PhD Student Paper Competition (with RL Austman); ASME Summer Bioengineering Conference, Marco Island, FL

J.M. Floryan

Outstanding Reviewer, ASME Journal of Heat Transfer, 2007
Humboldt Research Prize (Germany), 2007
Engineering Prize for Achievements in Research, The University of Western Ontario (2007)

J.A. Johnson

USC (University Students' Council) Teaching Honor Roll Certificate Award of Excellence in recognition for achieving very high teaching evaluations

R. Klassen

The Terry E. Base Award in Undergraduate Teaching

X.A. (Andy) Sun

Canada Research Chair, Tier II, NSERC, Canada, Nanomaterials for Fuel Cells, 2007
Canada Foundation for Innovation Leaders Opportunity Fund (LOF), Canada, 2007
Early Researcher Award, 2006-2011

J. Yang

Canada Foundation for Innovation Leaders Opportunity Fund (LOF) Award, 2008.

FACULTY MEMBERS AND ADMINISTRATIVE STAFF

1. FULL-TIME FACULTY MEMBERS



S. Asokanthan, Ph.D.
Associate Professor
Btech (IIT) 1981
PhD (Waterloo) 1986
GCED (Queensland) 1996

Dynamics and Control of Flexible Rotating Multi-body Systems. Applications cover a range of Mechanical and Aerospace Engineering Applications. Emphasis is placed on Gyroscopic, Stochastic, Hybrid (distributed/ discrete), and Time-varying systems.

519-661-2111, Ext: 88907, Email: sasokanthan@eng.uwo.ca



R.O. Buchal, Ph.D., P.Eng.
Associate Professor

BASc (British Columbia) 1980
MASc (British Columbia) 1984
PhD (British Columbia) 1987

Design methods and tools, design education, instructional technology, manufacturing inspection planning.

519-661-2111, Ext: 88454, Email: rbuchal@eng.uwo.ca



J.R. Dryden, Ph.D., P.Eng.
Associate Professor

BASc (Windsor) 1973
PhD (Windsor) 1977

Conduction of heat in solids, solid mechanics, energy methods.

519-661-2111, Ext: 88307, Email: jdryden@eng.uwo.ca



C.E. Dunning, Ph.D., P.Eng.
Assistant Professor

Dipl in Engg (Cape Breton) 1992
BEng (TUNS) 1995
MSc –Medical Biophysics (TUNS) 1997
PhD (Western) 2001

Human biomechanics, joint implant design/ improvement, joint motion and loading, and biomechanical load transfer.

519-661-2111, Ext 88306, Email: cdunning@eng.uwo.ca



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

MSc (Warsaw) 1974
PhD (Virginia Tech) 1990

Flow Control; Flow Manipulation; Hydrodynamic Stability; Boundary Layers; Laminar-Turbulent Transition; Interfacial Fluid Mechanics; Thermocapillary Flows; Convection; Rupture Problems; Moving Boundary Problems; Spectral Methods; Direct Solutions of the Navier-Stokes Equations.

519-661-2111, Ext: 88330, Email: floryan@eng.uwo.ca



T.R. Jenkyn, Ph.D., P.Eng.

Assistant Professor

BASc (Toronto) 1994
MASc (Toronto) 1996
PhD (Strathclyde) 1999

'In vivo' biomechanics; Medical imaging; Surgical simulation; Gait & motion analysis; Orthopaedic biomechanics; Trauma & sport injuries; Disabilities resulting from osteoarthritis; Skeletal muscle function; Inverse dynamic modeling.

519-661-2111, Ext: 88339, Email: tjenkyn@eng.uwo.ca



L.Y. Jiang, Ph.D.
Assistant Professor

BSc (USTC) 1994
MSc (Harbin) 1999
PhD (Alberta) 2005

Nanocomposites; Nanomechanics; Carbon Nanotubes; Multi-Scale Modelling; Micromechanics; Composites; Functionally Graded Materials; Fracture Mechanics and Failure Analysis of Materials; Smart Structures; MEMS and NEMS; Health Monitoring of Engineering

519-661-2111, Ext: 80422, Email: lyjiang@eng.uwo.ca



J. Johnson, Ph.D., P.Eng.
Professor

Dipl in Pure and Appl Sci (Sir George Williams) 1973
BSc (Concordia) 1977
BEng (McGill) 1982
PhD (TUNS) 1990

Orthopaedic Bio-engineering, Implant Design, Hand and Upper Limb Biomechanics, Joint Motion and Kinematics, Computer-Assisted Surgery.

519-661-2111, Ext: 88255, Email: jajohnso@eng.uwo.ca



R.E. Khayat, M.Eng., Ph.D.
Professor

BEng (McGill) 1980
MEng (McGill) 1982
PhD (McGill) 1989

Polymer processing; linear and nonlinear hydrodynamic stability; free surface and interfacial flows; computer simulation of Newtonian and non-Newtonian fluid mechanics.

519-661-2111, Ext: 88253, Email: rkhayat@eng.uwo.ca



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

BSc (Toronto) 1984
MSc (Manitoba) 1986
PhD (Toronto) 1990

Relationships between plastic deformation and microstructure in metallic and non-metallic systems.

519-661-2111, Ext: 88323, Email: rklassen@eng.uwo.ca



G. K. Knopf, Ph.D., P.Eng.
Professor

BA (Saskatchewan) 1984
BEng (Saskatchewan) 1984
MSc (Saskatchewan) 1987
PhD (Saskatchewan) 1991

Intelligent design tools; interactive data visualization; deformable geometric models; 3D shape measurement; optical actuation; bioelectronic detectors and imaging arrays.

519- 661-2111, Ext: 88452, Email: gknopf@eng.uwo.ca



P. Kurowski, Ph.D., P.Eng.
Assistant Professor

MEng (Warsaw) 1978
PhD (Warsaw) 1983

Machine Design, Design Analysis, Finite Element Analysis, Product Design, Kinematics and Dynamics of Machines, Mechanics of Materials, Design Projects.

519- 661-2111, Ext: 80125, Email: pkurowski@eng.uwo.ca



M.D. Naish, Ph.D.
Assistant Professor

BESc (Western) 1996
BSc (Western) 1996
MAsc (British Columbia) (1999)
PhD (Toronto) (2004)

Mechatronics, multi-sensor systems, active vision systems, sensor planning, intelligent systems, robotic devices and medical robotics.

519-661-2111, Ext: 88294, Email: naish@eng.uwo.ca



S.P. Salisbury, Ph.D., P.Eng.
Assistant Professor

BASc (Waterloo) 1995
PhD (Toronto) 2007

Development of precision positioning systems and linear motors for biomedical applications. Integration of sensors, modelling and analyzing dynamic systems, development of real-time controllers and control of piezoelectric materials.

519-661-2111, Ext: 80174, Email: ssalisbury@eng.uwo.ca



E. Savory, Ph.D., C.Eng.
Associate Professor

B.Sc (Surry) 1981
PhD (Surry) 1985

Industrial and environmental aerodynamics, Wind effects on buildings and structures, Cavity flows, Jets and plumes, Hemodynamics.

519-661-2111, x 88256, email: esavory@eng.uwo.ca

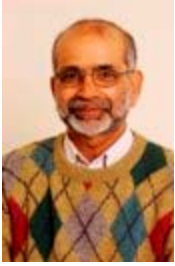


Shinozaki, D. Phil., P.Eng.
Professor

B.Eng. (McMaster) 1967
M.Sc. (McMaster) 1968
D.Phil. (Oxford) 1972

Polymer structure and properties, nanostructural engineering, micromechanics

519-661-2111, Ext: 88519, Email: shinozak@eng.uwo.ca



A.V. Singh, Ph.D., P.Eng.
Professor

BSc(Eng) (Ranchi) 1968
MAsc (Ottawa) 1971
PhD (Ottawa) 1975

Solid Mechanics - computational energy methods, vibration & stability of continuous systems, mechanics of composite material plates & shells, mechanics of piezo-electric materials & Micro Electro Mechanical Systems (MEMS).

519-661-2111, Ext: 88321, Email: avsingh@eng.uwo.ca



A.G. Straatman, Ph.D., P.Eng.

Associate Professor
BESc (Western) 1991
MESC (Western) 1992
PhD (Waterloo) 1995

Non-stationary Turbulent Flows, Pulsatile Flows & Hemo-dynamics, Convective Heat Transfer, Enhancement of Convective Heat Transfer using Porous Metals, High-Performance Parallel Computing, Material Property Prediction in Metal Die-casting, Application of CFD.

519-661-2111, Ext: 88249, Email: astraatman@eng.uwo.ca



X. Sun, Ph.D.
Assistant Professor

BSc (China) 1985
MSc (China) 1989
PhD (UK) 1999

Nanomaterials, Carbon Nanotubes, Nanowires, Nanoparticles, Nanotechnology, Smart & Functional Materials, Biomaterials, Fuel Cells, Sensors, Micro/Nano Fabrication, Surface Engineering, Corrosion Protection, Microscopy.

519-661-2111, Ext: 87759, Email: xsun@eng.uwo.ca



J.T. Wood, Ph.D., P.Eng.
Associate Professor

BASc (Waterloo) 1988
MAsc (Waterloo) (1991)
PhD (McMaster) 1995

Mechanical characterization of materials, composite materials, deformation processing, materials selection in mechanical design.

519-661-3482, Email: jwood@eng.uwo.ca



J. Yang, Ph.D.
Assistant Professor

BASc (China) 1998
MASc (China) 2000
PhD (Alberta) 2004

Biofluidics/Microfluidics/ Nanofluidics, Lab-on-a-chip/Biochip, Nanotechnology, MEMS, Biosensor, Cell Adhesion and Signaling, Single Molecule Kinetics, Molecular Self-Assembly, Colloid and Surface Science, Smart Material and Composite, Biomechanics, Solid Mechanics, CAE/CAD.

519-661-2111, Ext: 80158, Email: jyang@eng.uwo.ca



C. Zhang, Ph.D., P.Eng.
Professor

BSc Eng. (Xian) 1982
MSc Eng. (Xian) 1984
PhD (New Brunswick) 1990

Research interests are in the area of numerical simulations of turbulent, multi-phase, and reactive flows. The main field of her research is two-phase flows in condensers, turbulent reactive flows and control in industrial furnaces and automobile engines, and gas-solid flows in fluidized beds, powder spray systems, and pulmonary drug delivery.

519-661-2111, Ext: 88345, Email: czhang@eng.uwo.ca

2. PROFESSORS EMERITI

E.S. Nowak, Professor; Ph.D

J.D. Tarasuk, Professor; P. Eng.; Ph.D.

3. ADJUNCT ACADEMIC PROFESSORS

E. Bordatchev, Ph.D., Dr.Sc.(Eng)

National Research Council- IMTI

519-430-7107

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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.

G. Campbell, Ph.D., P.Eng. C.C.E.

National Research Council -IMTI

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3-D forming of hydrogels for medical applications (polyvinyl alcohol cryogel, twin-screw extrusion process); Prosthetic implants (hip, knee, intervertebral disc, heart valve). Tissue-mimicking phantoms (morphology, biophysical properties, medical imaging).

R. Canas, Ph.D.
National Research Council-IMTI
519-430-7102
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Mathematics and physics modeling. Finites element, Computational Fluid Dynamics, Particle modeling, High performance computing and high performance graphic. Haptics and Virtual Environment. Non Destructive Testing. Application for Manufacturing, Automotive, Aerospace and Nuclear Energy.

H. ElMaraghy, Ph.D.
University of Windsor
Manufacturing Systems

H.Y. Feng, Ph.D.
Associate Professor, Dept of Mechanical Engineering
The University of British Columbia
6250 Applied Science Lane, Vancouver, B.C. V6T 1Z4
604-822-1366 Fax: 604-822-2403
Email: feng@mech.ubc.ca

Precision CNC Machining; Computer-Aided Design and Manufacturing; Precision Geometric Inspection.

R. Gurka, Ph.D.
Department of Chemical Engineering
Ben-Gurion University of the Negev
Beer Sheva, 84105, Israel
Email: gurka@bgu.ac.il

Turbulent and complex flows; Transport phenomena in biological flows; Experimental fluid dynamics.

P.N. Kaloni, M. Tech., Ph.D.
Professor Emeritus, University of Windsor
519-253-3000, ext. 3024
E-mail: Kaloni@uwindsor.ca Pkaloni@uwo.ca

Mathematical Modeling of Physical Problems in Fluid Mechanics; Non-Newtonian Fluids; Viscoelastic Fluids; Magnetic Fluids; Flow and Heat Transfer in Porous Media; Linear and Non-linear Stability of Convection Problems.

R. Martinuzzi, Ph.D., P.Eng.
Dept. of Mechanical & Manufacturing Engineering
University of Calgary, Calgary, Alberta
403-220-6627
Email: rmartuni@ucalgary.ca

Turbulence research; heat transfer in external, cross-flow heat exchanges and internal flows; three-dimensional anisotropic flow fields.

S. Nikumb, Ph.D.
National Research Council-IMTI
519-430-7058
Email: suwas.nikumb@nrc.gc.ca

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.

E. Nowak, Ph.D., P.Eng.
Dept of Mechanical & Materials Eng,
University of Western Ontario
Co-director, Multi-disciplinary Accident Research Team
519-661-2127

Road safety, Canadian Motor Vehicle Safety Standards, Performance of vehicle safety features, Collision reconstruction, Bio-mechanics of injury related to crashes, Causes of collisions.

D. Steinman, Ph.D.
Mechanical & Industrial Engineering
University of Toronto
416-978-7781
Email: steinman@mie.utoronto.ca

Biomedical Engineering and Fluid Sciences. His work focuses on the integration of computational fluid dynamics (CFD) & medical imaging, & the use of such "image-based CFD" & "virtual imaging" techniques to improve the understanding, diagnosis & treatment of vascular diseases.

L. Wang, P.Eng., Ph.D.

Email: lwang35@uwo.ca

Distributed machining process planning; Adaptive assembly process planning; Web-based real-time monitoring and control of distributed machines; Function block-based integration of planning, scheduling, and execution monitoring.

L. Xue, Ph.D.
Group Leader, Material Addition Processes
National Research Council-IMTI
519-430-7059
Email: Lijue.Xue@nrc-cnrc.gc.ca

Development of laser and other materials processing technologies, new materials, metallurgical characterization and evaluation of material's properties and responses (including corrosion, wear, tensile, compression, fatigue, etc.).

C. Zemach, Ph.D.
Los Alamos National Laboratory, New Mexico, U.S.A.
Fluid Dynamics

4. VISITING PROFESSORS

Masahito Asai (Department of Aerospace Engineering, Tokyo Metropolitan University, Hino, Japan) for two weeks (hosted by J.M. Floryan)

5. ADMINISTRATIVE SUPPORT STAFF

Chris Seres

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Belle Smaill

Graduate Affairs Assistant
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Susan Bock

Undergraduate Affairs Assistant
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6. TECHNICAL SUPPORT STAFF

Walid Altahan

Laboratory Manager
Spencer Engineering Building, Room 1063
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Dave Lunn

Laboratory Supervisor
Spencer Engineering Building, Room 1066
Telephone: 519-661-2111 Ext: 81516
Email: dalunn@uwo.ca

Bert Verhagen

Laboratory Supervisor
Spencer Engineering Building, Room 3054B
Telephone: 519-661-2111 Ext: 88346
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Adam Woodhouse

Laboratory Supervisor
Spencer Engineering Building, Room 1065
Telephone: 518-661-2111 Ext: 88282
Email: awoodhou@uwo.ca

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, ES 2211F/G, MME 2202A/B, MME 2204A/B, MME 2213A/B, MME 2259A/B, MME 2260A/B, MME 2273A/B, Statistical Sciences 2143A/B, 0.5 non-technical elective*. *Selection of the non-technical elective must be approved by the Department Counselor to satisfy the CEAB requirements of subject matter that deals with central issues, methodologies, and thought processes of the humanities and social sciences. An approved list can be found on the Engineering website.

Third Year Program

Applied Mathematics 3413A/B, ECE 3373A/B, ECE 3374A/B MME 3303A/B, MME 3307A/B, MME 3334A/B, MME 3360A/B, MME 3379A/B, MME 3380A/B, MME 3381A/B, MME 3385Y.

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 2299, ES 4498F/G, MME 4419 or 4499. Six 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 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/LLB 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 LLB 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/LLB 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, ES 2211F/G, MME 2202A/B, MME 2204A/B, MME 2213A/B, MME 2259A/B, MME 2260A/B, MME 2273A/B, Statistical Sciences 2143A/B, 0.5 non-technical elective*. *Selection of the non-technical elective must be approved by the Department Counsellor to satisfy the CEAB requirements of subject matter that deals with central issues, methodologies, and thought processes of the humanities and social sciences. An approved list can be found on the Engineering website.

Third Year Program

Applied Mathematics 3413A/B, ECE 3373A/B, ECE 3374A/B MME 3303A/B, MME 3307A/B, MME 3334A/B, MME 3360A/B, MME 3379A/B, MME 3380A/B, MME 3381A/B, MME 3385Y.

Fourth Year Program

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

Fifth and Sixth Year Programs

MME 4450A/B, MME 4425A/B

One of: MME 4419 or MME 4499

In years five and six students must complete the following requirements for the LLB:

- The two compulsory upper-year Law courses
- At least three Law core-group courses (must include Law 5220)
- Additional Law courses equaling at least 25 credit hours (must include one of the optional courses listed below under "The Impact of Technology on Society")
- One Law course must have an essay requirement of at least two credit hours.

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:

- Ethical Issues: Law 5130 "Legal Ethics & Professionalism" – part of the first year Law curriculum.
- The 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", the former Law 453 "Internet Law", Law 5625 "Intellectual Property", Law 5630 "International Protection of Intellectual Property", or Law 5610 "Advanced Patent Law".

In addition, there may be a Selected Topics course offered which may be approved on an individual basis.

- Economics: Law 5220 "Income Taxation".

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 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.

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, MME 2202A/B, MME 2204A/B, MME 2213A/B, MME 2259A/B, MME 2260A/B, MME 2273A/B, Statistical Sciences 2143A/B, ES 2211F/G, Business Administration 2299.

Third Year Program

Applied Mathematics 3413A/B, ECE 3373A/B, ECE 3374A/B, ES 4498F/G, MME 3303A/B, MME 3307A/B, MME 3334A/B, MME 3360A/B, MME 3379A/B, MME 3380A/B, MME 3381A/B, MME 3385Y.

Fourth Year Program

MME 4425A/B, MME 4450A/B.

Regular Year 1 of the MD program.

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 4419 (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](#), [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 3300](#), [3301](#), [3302Y](#), [3303](#), [3304](#), [3305Q/R/S/T](#), [3307](#), [3308A/B](#), [3316](#).

Fourth Year Program

[Applied Mathematics 3413A/B](#), [MME 3303A/B](#), [MME 3307A/B](#), [MME 3334A/B](#), [MME 3360A/B](#), [MME 3379A/B](#), [MME 3380A/B](#), [MME 3381A/B](#), [MME 3385Y](#), [ECE 3373A/B](#), [ECE 3374A/B](#), [Business Administration 4430](#).

Fifth Year Program

MME 4419 or MME 4499, MME 4492A/B, ES 4498F/G

Two 0.5 technical electives

Business Administration 4415Q/R/S/T, 4428A/B, 4466A/B, three 4400 level Business half course equivalents.

Exchange Programs

Academic exchange opportunities are not available for the combined degree program because of the core and elective courses required in Years Four and Five.

2. UNDERGRADUATE ENROLLMENT

FULL-TIME UNDERGRADUATE ENROLMENT(2007-2008)											
	Year 1		Year 2		Year 3		Year 4		TOTAL		TOTAL
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
Mechanical	n/a	n/a	68	14	76	12	75	11	219	37	256
PART-TIME UNDERGRADUATE ENROLMENT (2006-2007)											
	Year 1		Year 2		Year 3		Year 4		TOTAL		TOTAL
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
Mechanical	n/a	n/a	1	0	27	1	5	0	33	1	34

3. DEGREES GRANTED

Fall 2007	Spring 2008
8	71

4. UNDERGRADUATE AWARDS

Recipients (Fall 2007) – Students registered in the Department of Mechanical and Materials

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

3rd Year MME Awarded annually to a student in his/her third year in the Department of Mechanical and Materials Engineering based on the candidate's mark in Thermodynamics II (MME 334a/b), financial need, continuing educational studies, and career goals in the heating, refrigeration and air conditioning profession. The student must have a minimum YWA of 70% and have taken five full courses during the year. Students repeating MME 334a/b or the former MME 258a/b do not qualify. This award is made possible by the generosity of ASHRAE, London Chapter, Canada.

Awarded to: Hassan Qadri

Andrea Bailey Memorial Award (1- \$1800.00)

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: Meghan Woszczynski

Gordon F. Chess Award (1-\$500.00)

3rd Year ANY Awarded to a student entering the third year in the Faculty of Engineering. Candidates must have successfully completed the first two years of the Engineering program and must exhibit broad interests and leadership qualities as demonstrated by participation in university and/or community activities

Awarded to: [Ryan Katchky](#)

DELSCAN Corporation Scholarship in Engineering Science (1-\$2000.00)

4th Year ANY Awarded annually to a full-time undergraduate student entering fourth year in the Faculty of Engineering. Applicants must have a minimum 80% average. Preference will be given to students who have demonstrated involvement in extra-curricular activities at the University or in the community. This scholarship is dedicated to William J. Malone, Past President of Delcan Corporation.

Awarded to: [Aida Kashigar](#)

Ian Duerden Memorial Award (1-\$1000.00)

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: [Nathan Lewcock](#)

Lynda Diane Shaw Memorial Award (1-\$900.00)

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: [Pencilla Lang](#)

Suncor Scholarships (3-\$5000.00)

4th Year ANY Awarded to three (3) fourth year students who have successfully completed the Industry Internship Program with Suncor. Students do not need to apply to this award.

Awarded to: [Patrick Oskirko](#)

Dr. L. Stuart Lauchland Scholarship (1-\$1000.00)

ANY Awarded to a student in any year of Engineering based on academic achievement (minimum 80% average). The recipient will be selected by the Faculty of Engineering. This scholarship was established by a generous donation from Dr. Richard M. Dillon through Foundation Western.

Awarded to: [Jeremy Cepek](#)

Donald P. Morris Engineering Award (1-\$1000.00)

Awarded to a full-time student combined Engineering and Honors Business Administration degree program based on financial need and academic achievement (minimum 70 % average).

Awarded to: [Hassan Qadri](#)

Lynn Fordham Awards in Science and Engineering (2-\$2500.00)

ANY Awarded annually to students in Science or Engineering who demonstrate financial need, academic excellence (full course load and minimum 75% average) and possess leadership qualities. If possible, one award will be given to a student in first year, one to a student in second year, one to a student in third year and one to a student in fourth year. These awards were established through Foundation Western by Mr. J. Lynn Fordham (BSc Physics'46).

Awarded to: [Aida Kashigar](#)

Gonder Continuing OSOTF Award (1-\$2000.00)

Year 2, 3, or 4 ANY Awarded to a full-time undergraduate student in year 2 or higher of Engineering who demonstrates financial need and maintains a minimum 75% average. This award will continue until the recipient completes his or her undergraduate program as long as the student meets the stated criteria each year. A new recipient will be selected when the current recipient no longer qualifies. This award was established through Foundation Western by the generosity of John and Katharine (nee Burdick) Gonder in recognition of the contribution of Russell (BESc'58) and Leota Gonder to the profession of engineering and The University of Western Ontario.

Awarded to: [Aida Kashigar](#)

Ontario Professional Engineers Scholarships (4-\$1250.00)

Year 2, 3, or 4 ANY Awarded to undergraduate students in any Engineering program, based on academic achievement (minimum 80%) and demonstrated leadership skills as a major participant in an organization or activity related to engineering that furthers their professional development. The Faculty of Engineering will select the recipients. These scholarships are supported by a generous gift from the Ontario Professional Engineers Foundation for Education.

Awarded to: [Jeremy Cepek](#)

Parents Fund Award in Engineering Science

Awarded annually to a student in second, third or fourth year in the Faculty of Engineering who has demonstrated academic achievement while demonstrating leadership in the community and participating in extracurricular activities. Established in 1997 through the generosity of Western Parents.

Awarded to: [Ryan Katchky](#)

Entrance Scholarships

All students entering the Faculty of Engineering under the Engineering Excellence Admission Program will be offered a one year Western Academic Scholarship of Excellence (\$2,000) if their Grade 12 average is 90% or higher, or a one year Western Scholarship of Distinction (\$1,000) if their Grade 12 average is between 85.0 and 89.9%. These scholarships are offered during the admission process and are not conditional on the academic performance during the first year of studies.

Exceptional candidates may qualify for other entrance scholarships such as:

- ***The President's Entrance Scholarships*** - \$6,000 annually for four years, plus first year room and board.
- ***The Faculty Entrance Scholarship*** - \$4,000 annually for four years, plus first year residence room costs.
- ***Continuing Admissions Scholarships*** - \$2,000 annually for four years.

President's Entrance Scholarships

Awarded to: [Pencilla Lang](#); [Samir Raza](#)

Alexander Charles Spencer Admission Scholarships

Awarded to: [Riley Horne](#), [Daniels Stranges](#)

Faculty Entrance Scholarship

Awarded to: [Ryan Katchky](#)

Four Year Continuing Admission Scholarship Program

Awarded to: Scott Charles Elmer Brandon; Diane Davies; Nathan Andrew Evetts; Derek Gateman, Joshua Giles; Reynaldo Martin Glombowski; Miranda Ann Restorick, Joel Alexander Vandermarel

Recipients of Engineering Awards of the Graduating Class 2008 – 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 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: David Cesar Del Rey Fernandez

The Ontario Professional Engineers Gold Medal

This medal is awarded by the Professional Engineers of Ontario, to the fourth-year engineering student with the highest aggregate marks for the four years of the undergraduate program provided that the student obtains first-class honours standing in the work of the final year

Awarded to: Pencilla Lang

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 Mechanical and Materials Engineering program who demonstrated outstanding achievement.

Awarded to: Dale Podolsky

The ASHRAE Award

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.

Awarded to: Michael Mosnier

The Donald D.C. McGeachy Award for Materials Engineering

This award is a gift of Wolverine Tube (Canada) Ltd., London, Ontario, in recognition of the many contributions of Mr. McGeachy to the community, to The University of Western Ontario and to industry in the City of London. It is awarded to the fourth-year engineering student in the Mechanical and Materials Engineering Department who in the opinion of the Faculty, has the highest academic standing in Materials Engineering.

Awarded to: Michael Demaiter

5. DESIGN PROJECTS

Projects at a Glance

Projects	Students	Faculty Advisor	Industry Sponsor
Design of a test facility to investigate the physics of a downburst	Eric Li, Mohamed Loulou, Hassan Qadri, Andrew Villarico	Eric Savory	
Design of the Structural Component of a Wing for an Aerobatic Aircraft	Karin Hirooka, Channing Hsieh, Srdan Vukosavijevic	Bjarni Tryggvason	
Remote-controlled aircraft for Spin Testing	Jeremy Cepek, Chris Degroot, David Del Rey Fernandez, Brad Pietrzak	Bjarni Tryggvason	
Lunar Rover Wheel and Gear Articulation	Jeffrey Sutton, Chris DeCastro, Zubair Ahmed, Brian Vermeire	Bjarni Tryggvason	
Lunar Rover Body Design	Jonathan Ewart, Joshua Cheifetz, Nikola Zubic	Bjarni Tryggvason	
The Mighty Mechanical Moth - M3	Shyam Ganesh, Tim Loh, Stephanie Puzio,	Bjarni Tryggvason	
Lunar Rover Landing System	Brandon Rundle	Bjarni Tryggvason	
Design of a High-Temperature Nanoindentation Hardness Tester	Scott Hall, Kevin McCumber, Rob Scott, Chris Waring	Robert Klassen	
Myoelectric Hand	Alison Merrick	Michael D. Naish	
Nanowire Synthesis	Cezary Baraniecki, Scott Hennessy, Jeff Young	Andy Sun	
Jig for Fluoroscopic RSA	Meghan Whitney, Muriah Foster, Andrew Inman, Jonathan Michienzi	Tom Jenkyn	
Plantar-Flexion Measurement Test Fixture	Bryan Ashbourne, Mike Houston, Jason Keller	Tom Jenkyn	
Surgical Attachment Device	Pencilla Lang	Jim Johnson	
Accessible Incontinence Control Device	Aida Kashigar, David Levin, Dale Podolsky	Jim Johnson	
Formula SAE Cooling System	Nora Kelly, Adam Reed	Tony Straatman	
Formula SAE Suspension	Stan Whatmough, Piotr Wojnarowicz	Anand Singh	
Sunstang Solar Car	Pranay Krishen, Dan Rogers, Antony La Torre, Miguel Maglutac, Mike Auer	Ralph Buchal/Shawn Salisbury	
Intelligent Ground Vehicle	Mike Hotz, Chris Fera, Ian Swentek	Michael D. Naish	
Intelligent Percussion System	Tyler Abbey, Brit Cruise, Mike Vance	Michael D. Naish	

Industry Projects			
Sensor Positioning System	John Freeman, Eric Sakaue, Daniel Taylor	Sam Asokanthan	Trojan Technologies
Roll Former Automation	Al-Karim Mooloo	Ralph Buchal	Conquest Steel Inc.
Delta Faucet Green Initiative	Brent Bell, Adam Zakrzewski, Scott Ralph, Adam Anderson	Ralph Buchal	Delta Faucet
Lightweight Sport Scooter	Hassan Aboujmeih, Omar Abu Aisha, Navneet Birk, Hrushikesh Gandhi, Alim Kanji	Ralph Buchal, Paul Kurowski	Meridian Technologies
Magnesium Scooter Feasibility Study	Karan Gupta, Patrick Oskirko, Rory McIntyre, Curtis Calleja, Tom Kurowski	Ralph Buchal, Paul Kurowski	Meridian Technologies
Crate Opener	Jonas Selick, Raymond Liang, Michael Mosnier	Paul Kurowski	Sun Valley Foods
Services Building HVAC System Design	Michael Demaiter, Justin Pommerville, Drew Kennedy, Mark Plows	Walid Altahan	UWO Physical Plant
Chilled Water Distribution	Basem Ismail, Suhail Shaikh, Alex Strachan	Walid Altahan	UWO Physical Plant
Maintenance of Playing Fields	Luke Davie, Meghan Woszczyński, Jack Tsai, Khalid Al-Masri	Ralph Buchal	UWO Physical Plant
Determination of in-flight loads on a wing from an attached stinger	Tom Enns, Ryan Hall	Bjarni Tryggvason	Aerocomp Aerospace
Universal Sealing System for Fruits and Vegetables	Marika Marty, Luke Bingleman, Sean Hrboticky, Mark Breese, Terri Sleiman	Paul Kurowski	Ag-Tronic Control Systems Inc.

6. EXCHANGE PROGRAMS

Student	Institution	Country
Florent Bouvier	Université de la Méditerranée (Aix-Marseille II)	France
Alison Jane Higgins	University of Leeds	United Kingdom

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.

Below are the students in Mechanical Engineering who completed an Internship.

First	Last	Company
Michael	Adamovsky	Dashwood Industries
Ryan	Arbuthnot	Times Fiber Canada Ltd.
Brendan	Bonnar	CAMI
Andrew	Buston	Presstran
Adam	Carreau	CAMI
Kane	Choy	Petro - Canada
Tyler	Chrusz	GE Canada
Alex	Cote	Talisman Energy
Jonathan	Eng	Honda
Jordan	Foster	Formet Industries
Mark	Furgala	Formet
Patrick	Greer	OPG
Matt	Heffernan	RIM
Alexander	Holt	Suncor
Jerome	James	R&D Canada
Mark	Janz	Union Gas
Robbie	Koekkoek	Magna Closures Group
Brett	Manes	Imperial Oil
Daniel	Neill	General Motors
Brent	Robitaille	CAMI
Brian	Sinclair	Volvo
Chantel	Smith	Union Gas
Ryan	Striukas	SNC Lavalin
Qi	Zhang	Dr. Zhu

8. SUMMER ENGINEERING CO-OP PROGRAM

First_Name	Last Name	Program	Employer
Ryan	Alexander	Mechanical	PEIKER
Curtis	Calleja	Mechanical	3M
Neil	Van Andel	Mechanical	Air Canada Fly Jazz
Rachel	Oosterhuis	Mechanical	BP Canada
Lyla	Gharib	Mechanical	Brose Inc.
Alex	Light	Mechanical	Canadian Natural Resources Limited
Andrew	Perkins	Mechanical	Ford
Alison	Merrick	Mechanical	General Dynamics Land Systems
Chris	Waring	Mechanical	General Dynamics Land Systems
Ian	Kerwin	Mechanical	Linamar
Jeff	Young	Mechanical	Linamar
John	Freeman	Mechanical	Meridian
Mark	Bresee	Mechanical	RIM
Cezary	Baraniecki	Mechanical	Schaeffler Canada
Kyle	Moscone	Mechanical	TransAlta
Ryan	Hall	Mechanical	Vari-Form

9. INTERNATIONAL STUDENTS

This year our Department hosted one student from India, one student from the United Arab Emirates, one student from the People's Republic of China and one student from Lebanon

GRADUATE EDUCATION

1. GRADUATE RESEARCH PROGRAMS

The current graduate program in the Faculty of Engineering is fully accredited by the Ontario Council of Graduate Studies. The Department has restructured the Graduate Research Programs by focusing on the individual areas of strength. The Masters of Engineering Science (MESc) and PhD programs comprise the following fields:

- (1) Mechanical Engineering,
- (2) Thermofluids,
- (3) Materials and Solid Mechanics,
- (4) Automation Technologies and Systems.

Mechanical Engineering

The Department has four OCGS approved research areas, including (1) Thermofluids, (2) Materials & Solid Mechanics, (3) Automation Technologies & Systems, and (4) Mechanical Engineering. Specialized flyers are available for the first three areas. This flyer covers all other research areas within the Mechanical Engineering program, including **Biomechanics**, which exposes students 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.

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.

Thermofluids

The Thermofluids 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 addition 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 Thermofluids 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 Thermofluids 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*
- MME9712 *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 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.

2. GRADUATE DEGREE PROGRAMS

Course-based Master's (M.Eng.) Program

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. If enrolled full-time a student can complete the degree in one year. M.Eng. program is focused to become an effective tool to address the significant need for education and integration of internationally trained engineers. It provides new Canadians who are trained further in engineering outside Canada, with a venue to update their knowledge in accordance with the needs of the Canadian technology sector. The requirement for completion of the program is ten half courses, or eight half courses and a project.

Research-based Master's (M.E.Sc.) Program

This 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 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.

Ph.D. Program

Like the M.E.Sc, this 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.

3. GRADUATE ENROLLMENT

	M.Eng	M.E.Sc.	Ph.D.	TOTAL
Summer 2007	21	29	44	94
Fall 2007	21	36	48	105
Winter 2008	17	36	54	107

4. GRADUATE DEGREE GRANTED

OCTOBER 2007 CONVOCATION

Student name	Degree	Completion Date	Thesis Exam Date	Supervisor/ Co-supervisor	THESIS TITLE
Abbasi, Habib ur Rehman	MEng	31-Aug-07	n/a	Tryggvason, B	ES 500 Project
Banerjee, Avisekh	PhD	8-Aug-07	1-Aug-07	Feng,S/ Bordatchev, E	Integrated Process Planning for 21/2D Pocket Machining
Bose, Bipasha	MESc	27-Aug-07	17-Aug-07	Klassen, R	Nanoindentation creep of the 2024 Al Alloy
Cang, Yuan	MEng	31-Aug-07	n/a		
Fotia, Matthew	MESc	30-Aug-07	23-Aug-07	Floryan, JM	Stability of a Poiseuille Flow with Periodic Wall Heating
Liu, Zhao	MEng	31-Aug-07	n/a	Buchal, R	ES 500 Project
Long, An	MEng	31-Dec-07	n/a		
Majithiya, Kamleshhkumar	MEng	31-Aug-07	n/a	Tryggvason, B	ES 500 Project
Naqavi, Iftekhar	PhD	30-Aug-07	22-Aug-07	Savory, E.	Direct Numerical Simulation of a Rectangular Surface Jet

Student Name	Degree	Completion Date	Thesis Exam Date	Supervisor/ Co-Supervisor	THESIS TITLE
Tomlinson, Philip	MESc	14-Aug-07	10-Aug-07	Klassen, R/ Wood, J	Development of Numerical Models of a Flow Forming Operation
Wu, Junliang	MEng	31-Aug-07	n/a		
Yan, Jing	MEng	31-Aug-07	n/a		
Yang, Xiao Yu	MEng	31-Aug-07	n/a	Zhang, C	ES 500 Project
Zhang, Lijuan	MESc	27-Aug-07	17-Aug-07	Martinuzzi/ Zhang	Numerical Modelling of Indoor Airflow
Zhao, Dong	MEng	31-Aug-07	n/a		
Zheng, Tonghai	MEng	31-Aug-07	n/a		
Zhou, Yuqin	MESc	28-Jun-07	26-Jun-07	Sun, X	Synthesis and Characterization of Wox Nanowires
Wu, Xueyin	MEng	31-Aug-07	n/a		
JUNE 2008 CONVOCATION					
Aboumourad, Jehad	MEng	31-Dec-07	n/a		ES 500 project
Aghayan, Hamid	MEng	31-Dec-07	n/a		ES 500 project
Arens, Niels	MEng	30-Apr-08	n/a		ES 500 project
Bourgeois, Jason	MESc	15-Apr-08	14-Apr-08	Savory, E/ Zhang, C	Numerical studies with validation for better aero-engine centrifugal compressor design
Cai, Ningxu	PhD	19-Dec-07	5-Dec-07	Wang, L/ Feng, S	Adaptive Setup Planning and Dispatching
Cui, Yi	MESc	25-Apr-08	14-Apr-08	Buchal, R/ Jiang, J	Vehicle Steer-by-wire for active steering control based on nonlinear vehicle and tire models
Deva, Nandakishore	MEng	31-Dec-07	n/a		ES 500 project
Fahim, Muhammad	MEng	30-Apr-08	n/a		
Hu, Honggang	PhD	4-Feb-08	18-Jan-08	Zhang, C	Simulation of two-phase flow and heat transfer in condensers
Igwe, Philip	PhD	29-Jan-08	4-Jan-08	Knopf, G/ Canas R	Deformable VSOFM and Physics-based modeling for conceptual design
Kriznic, Peter	MEng	31-Dec-07	n/a		
Liu, Yong	MESc	25-Apr-08	21-Apr-08	Klassen, R	Thermal creep of Cu and Cu/Si3N4 thin film cantilever microbeam
Ma, Jianping	MESc	28-Jan-08	25-Jan-08	Zhang, C/ Jiang, J	Fault detection and solution in fixed in-core flux detectors
Ma, Zhonghui	MEng	30-Apr-08	n/a		
Naeem, Shahid	MEng	30-Apr-08	n/a	Yang, J	ES 500 project
Oviasuyi, Richard	MEng	31-Dec-07	n/a	Klassen, R	ES 500 Project
Roy, Matthew	MESc	22-Oct-07	16-Oct-07	Klassen, R/ Wood, J	Characterization of a flow forming process

Student Name	Degree	Completion Date	Thesis Exam Date	Supervisor/ Co-Supervisor	THESIS TITLE
Shahabi, Arman	MEng	31-Dec-07	n/a	Asokanathan, S	ES 500 project
Wang, Maosheng	MEng	30-Apr-08	n/a		
Yuan, Di	MEng	30-Apr-08	n/a	Zhang, C	ES 500 project
Yusuf, Imtiaz	MEng	30-Apr-08	n/a	Buchal, R	ES 500 project
Zhang, Jinlong	MESc	18-Apr-08	15-Apr-08	Yang, J	Blood separation on lab-on-a-chip device

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

January 1, 2007 to date:	MESc	PhD
Canadian/Perm. Residents	\$16,000/yr	\$18,000/yr
International	\$23,000/yr	\$25,000/yr

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. There are three

External Scholarships Recipients: 2007-2008 Competitions

Award	Name	Degree
OGS	McLACHLIN, Stewart	MESc
OGS	TANVEER, Mohammad	PhD
OGS	WHITNEY, Kristin	MESc
OGSST	LIN, William	PhD
NSERC	BOURGEOIS, Jason	MESc
NSERC	TEXEIRA, Jason	MESc

GRADUATE SEMINAR

Fall 2007

Date	Student or Guest	Supervisor/ Co-Supervisor	Presentation	Seminar Facilitator
Sep-17	Khaled Al-Arife	G. K. Knopf	Photo-Responsive Hydrogel for Controlling Flow on a Polydimethylsiloxane (PDMS) Microfluidic Chip	Dong Wang
	Vineet Bhakhri	R. Klassen/ J. Dryden	Length-scale dependence of deformation kinetics of gold at ambient temperature	
Sep-24	Lee Betchen	A. Straatman	Optimization of the Pore Structure of High-Conductivity Porous Metal Foams	Philip Igwe
	Thomas Bruce	J. Wood	Fracture of Glass Fiber – Epoxy Composites	
Oct-1	Dr. X.A. Sun		Nanotechnology for Clean Energy	
Oct-15	Ningxu Cai	L. Wang/S. Feng	Function Blocks Enabled Dynamic Setup Dispatching and Execution Monitoring	Yadav Khanal
	Selvakumar Kandasamy	A. Singh	Vibration Analysis of Open Shells of Revolution	
Oct-22	Yadav Khanal	R. Buchal	Design Theory: A Multi-Perspective Object-Oriented Model	Selvakumar Kandasamy
	Honggang Hu	C. Zhang	Numerical Simulation of Two-Phase Flow and Heat Transfer in a Steam Condenser Using a Modified k-ε Turbulence Model	
Oct-29	Dr. David James, Dept. of Mechanical and Industrial Engineering, University of Toronto		Flow of Complex Fluids	
Nov-05	Harish Pungotra	G.K. Knopf	Precise and Efficient Collision Detection of B-Spline Surface Virtual Models	Thomas Bruce

Nov-5	Syed Husain	J.M. Floryan	Development of a Gridless Technique for Simulation of Flows with Moving Boundaries	Thomas Bruce
Nov-10	Mohammad Z. Hossain	J.M. Floryan	Development of Novel Efficient Heat Exchangers: Instability Analysis	Honggang Hu
	Dong Wang	C. Zhang	Design & Implementation of Diesel Engine Emission Control Models through Numerical and Experimental Approaches	
Nov-19	Dr. A. Sobiesiak, Dept. of Mech. Auto and Materials Engineering, University of Windsor		Low Emissions, Fuel Flexible Combustion for Power Generation and Process Heating	
Nov-26	Jonathan Weiler	J. Wood/R. Klassen	Structure-property relationships for die-casting Magnesium alloy AM60B	Tianfu Wang
	Junming Li	J. Wood/D. Shinozaki	Thermodynamic Modeling of Porosity Formation during Non-Equilibrium Solidification in Magnesium Alloy Castings	
Dec-3	Jianping Ma	C. Zhang	Fault Detection and Isolation in Fixed In-Core Flux Detectors	Vineet Bhakhri
	Muhammad Tanveer	A.Singh	Linear and geometrically nonlinear vibration analysis of laminated composite plates	
Dec-10	Dr. Charles Ward, Dept. of Mechanical and Industrial Engineering, University of Toronto		Evaporation and Condensation of Water at Conditions Below its Triple Point	

Winter 2008

Date	Student or Guest	Supervisor/Co-Supervisor	Presentation	Seminar Facilitator
Jan-14	Mohammad Barakchi Fard	S. Feng	Optimal Tool Orientation in Five-Axis Flat-End Milling	William Lin
	Angela Kedgley	J.Johnson/ C. Dunning/ T. Jenkyn	Development of a Fluoroscopy-based RSA System and its Preliminary Applications	
Jan-21	Rebecca Austman	C. Dunning	Investigation of Bone Strains in the Distal Ulna Using Experimental and Finite Element Methods	Cheryl Quenneville
	Graham Hunt	E. Savory	Efficiency Improvements in Axial Flow Automotive Cooling Fans	
Feb-4	Dr. David Zingg, Director, Institute for Aerospace Studies (Canada Research Chair) University of Toronto		A Newton-Krylov Approach to Numerical Aerodynamic Shape Organization	
Feb-11	Cheryl Quenneville	C. Dunning/ J. Johnson	Development of an Apparatus to Produce High Impact Lower Leg Loading	Jonathan Weiler
	Khaled Sultan	A.Stratman	Natural Convection and Nucleate Boiling in High Porosity Porous Media	

Mar-03	William Lin	E. Savory	Velocity Measurements of the Turbulent Wall Jet	Botaog Peng
	Yougui Chen	X.A. Sun	Carbon Nanotube Synthesis & Applications on Catalyst Supports for Fuel Cells	
Mar-10	Bashar Albaalbaki	R. Khayat	Rayleigh-Benard Convection of Shear-Thinning Fluids	Rebecca Austman
	Mei Liu	J. Yang	On-demand multi-batch self-assembly of Hybrid MEMS systems by patterning solders of different melting points	
Mar-17	Dr. Jean W. Zu Dept of Mechanical and Industrial Engineering, University of Toronto		A New Handheld Device for In-vivo Measurement of Regional Soft Tissue Mechanical Properties	
Mar-24	Botaog Peng	C. Zhang	CFD Modelling on Hydrodynamics in Circulating Fluidized Bed Riser	Jhiyun Cho
	Matthew Shiu	G. K. Knopf	The methods of rapid fabrication of tooling for polymeric microfluidic devices	
Mar-31	Yu Liu	J. Yang	Nanoindentation of a Cell Membrane with Atomic Force Microscopy Targeting Elastic Properties Mapping of Soft Surface	Khaled Sultan
	Joel Book	S. Asokanathan	Modal Characterization of Sensing Organs in Insects	
Apr-04	Tianfu Wang	S. Asokanathan	Bounding Dynamics in Micro-Beam Structures	Mohammad Barakchi Fard
	Jhiyun Cho	S. Asokanathan	Nonlinear Instabilities in Rotating Thin Circular Rings	

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

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).

Thermofluids Group

Aerodynamic testing facilities:

- Two low-speed wind tunnels
- 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

Micro/Nano Fluids Laboratory facilities:

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

Access to other fluid dynamic related test facilities:

- Boundary Layer Wind Tunnel Laboratory (four wind tunnels and a water tunnel)
- 3-component laser Doppler velocimetry system
- Stereoscopic particle image velocimetry system
- High-speed camera system for flow visualization
- Laser Scanning Confocal Microscope (Dept of Anatomy and Cell Biology)
- Insurance Research Lab for Better Homes (CFI Facility)

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

Materials and Solid Mechanics Group

Access to Nanofab and Surface Science Western:

- Photolithography
- LEO 1530 E-beam Lithography
- LEO 1540XB FIB Lithography
- Plasma Enhanced Chemical Vapour Deposition (PECVD)
- Reactive Ion Etch - STS
- SIMS - Secondary Ion Mass Spectrometry
- ToF-SIMS - Time-of-Flight Secondary Ion Mass Spectrometry
- SEM-EDX - Scanning Electron Microscopy with Energy Dispersive X-ray analysis
- FESEM - Field Emission Scanning Electron Microscopy
- XPS - X-ray Photoelectron Spectroscopy

- Laser Raman Spectroscopy
- SAM/AES - Scanning Auger Microprobe/Auger Electron Spectroscopy
- AFM - Atomic Force Microscopy
- FTIR - Fourier Transform Infrared Spectroscopy

Metal Forming Laboratory (SEB 24:)

- Rolling mill
- wire drawing bench
- rotary swager,
- 125kN SinTech tensile tester.
-

Metal Casting and Heat treating Laboratory (SEB 3049):

- Furnaces
-

Composite Fabrication Laboratory (SEB 6):

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

Nanomaterials Fabrication and Characterization Laboratories (SEB 3072, 3074, TEB 324):

- 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 Instruments MicroPoint Laser System
- Fuel Cell station

Mechanical Testing Laboratory (SEB 10, SEB 3052):

- Mechanical and servohydraulic load frames ranging from 1kN to 500kN capacity

Polymer Engineering Laboratory (SEB 3055):

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

Tribology Laboratory (SEB 3064):

- A variety of wear testing machines including a Plinth and a Direct Observation Wear Machine.

Materials Characterization Laboratories (SEB 3045, 3047, 3051):

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

Polymer Engineering Laboratory (SEB 3068):

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

Dynamic and Sensing Systems Laboratory (SEB 3072):

- Vibration transducers, electrodynamic shakers, real-time signal and modal analysis software

Faculty and students in the Materials and Solid Mechanics group have access to the following major equipment and common facilities:

MME Undergraduate Teaching Laboratories: Metallographic preparation, Rockwell and Vickers hardness, Charpy impact pendulum

Surface Science Western and Nanofabrication Facility: A variety of state-of-the-art materials characterization tools including electron and atomic force microscopy and a wide variety of spectroscopic techniques, Photo-, E-beam and Focussed Ion Beam Lithography

Dept of Microbiology and Immunology: Transmission Electron Microscope

The Automation Technologies and Systems Group

Dynamic and Sensing Systems Laboratory (SEB 2070):

- Micron-scale and macroscopic vibration transducers
- Electro-dynamic shakers
- Real-time signal analyzers and modal analysis software
- Real-time control hardware/software

CAD/CAM/CAI Research Laboratory (SEB 37/37A):

- Fadal VMC 4020 vertical machining center with rotary table (A & B Axes)
- DEA *Swift* direct computer controlled coordinate measuring machine

Geometric Modeling & Virtual Sculpting Laboratory (SEB 3025A):

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

Bioelectronics and Biosensor Laboratory: (TEB 18) (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 Sencicam VGA cooled color digital CCD camera
- Tunable ArKr laser system
- Argon-Ion laser (457nm)
- He-Ne yellow laser (594nm)
- Infinium 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: (TEB 206)

- Cyberware 3D RGB head & shoulder scanner
- Fakespace Immersadesk R-2 virtual reality display

Sensing and Mechatronic Systems Laboratory: (SEB 2048)

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

Robotics and Automation Laboratory: (SEB 1068)

- 2 Motoman and 1 Fanuc industrial manipulators
- 10 Allen Bradley PLC trainers
- Firewire cameras

Research facilities available at National Research Council's Integrated Manufacturing Technologies Institute (NRC-IMTI):

- 5 high precision laser micromachining systems with different lasers
- 2 high speed micromilling systems
- Micro-EDM
- Micro-welding system
- Micro/nano-injection moulding system
- Dynamic optical profilometer
- Scanning electron microscope
- 5-axis CNC milling machine
- ABB industrial robot
- Multi-camera motion tracking system
- FARO single-target laser tracker
- FARO laser scene scanner
- HYSCAN 3D laser scanning probe
- Equipment for virtual environment technologies
- Equipment for precision fabrication processes

Research facilities available at Canadian Surgical Technologies and Advanced Robotics (CSTAR):

- 2 Mitsubishi robots
- Zeus MIS system
- 3 Aesop arms
- 2 ultrasound machines
- Haptic input devices
- Electromagnetic and optical tracking systems

The Nanofabrication Laboratory: (Physics & Astronomy Room 10) – restricted fee access

Biomechanics Group

The Jack McBain Biomechanical Testing Laboratory: (Dr. Cynthia Dunning)

The Biomechanical Testing Laboratory primarily conducts experimental in vitro research related to orthopaedic biomechanics. The current lab 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.

The Wolf Biomechanics and Imaging Laboratories: (Dr. Tom Jenkyn)

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: (Dr. Graham King and Dr. James Johnson)

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.

3. RESEARCH SUPPORT

Operating Research Funding by Source and year				
Year	Granting Councils ²	Other Peer Adjudicated ³	Contracts⁴	Others ⁵
2007	3,733,098	1,438,021	1,164,245	64,851

²NSERC Grants (this column does include equipment grants and conference grants)
³CFI grants, Centres of Excellence Grants (Federal and Provincial), Equipment Grants
⁴Industry Grants
⁵University allocated grants (Academic Development Fund, UWO Internal Funding)

PUBLICATIONS

1. REFEREED JOURNAL ARTICLES

1. Kerr M L, **Asokanathan S F**, and Jayasuriya S (2007) Multivariable QFT Based Control of a Single-Link Flexible Manipulator, *Journal of Vibration and Control*, Vol.13, No.1, pp. 3-27.
2. **Asokanathan S F** and Cho J_(2007) Dynamic Response-based Characterization of Ring-based Vibratory Angular Rate Sensors, *KSME Journal of Mechanics Science and Technology (MOVIC Special Edition)*, Vol. 21, No.3, pp. 965 – 969.
3. **Dryden, J.R.**, “Bending of Inhomogeneous Curved Bars”, *International Journal of Solids and Structures*, Vol. 44, 11-12, pp. 4158-4166, 2007.
4. Nychka, J.A., Clarke, D.R. , **Dryden, J.R.**, “Quantifying Cation Grain Boundary Diffusion”, *Journal of Applied Physics*, Vol. 102, 033907 1-5, 2007.
5. Mohammadi, M., **Dryden, J.R.**, “Thermal Stress I na Nonhomogeneous Curved Bar”, *Journal of Thermal Stresses*, Vol. 31, pp. 587-598, 2008.
6. Austman RL, Beaton BJB, Quenneville CE, King GJW, Gordon KD, **Dunning CE**. The Effect of Distal Ulnar Implant Stem Material and Length on Bone Strains, *Journal of Hand Surgery*, 32(6):848-854, 2007.
7. Austman RL, Quenneville CE, Beaton BJB, King GJW, Gordon KD, **Dunning CE**. Development of a Testing Methodology to Quantify Bone Load Transfer Patterns for Multiple Stemmed Implants in a Single Bone with an Application in the Distal Ulna, *Journal of Biomechanical Engineering*, 130(2):024502-1,4, 2008.
8. “Implicit Spectrally-Accurate Method for Moving Boundary Problems using Immersed Boundary Conditions Concept” by S.Z. Husain and **J.M. Floryan**, *J.Comp.Phys.*, v. 227, Issue 9, April 2008, pp. 4459-4477.
9. “Instability of Adverse-Pressure-Gradient Boundary Layers with Suction” by P.J.D.Roberts and **J.M.Floryan**. *AIAA J.*, v.46, 2008, pp.2416-2423.
10. “Immersed Boundary Conditions Method for Unsteady Flow Problems described by the Laplace Operator” by S.Z.Husain and **J.M. Floryan**. *Int.J.Num.Meth.Fluids.*,v.46, August 2007, pp.1765-1786.
11. **TR Jenkyn**, MA Hunt, I Jones, JR Giffin, TB Birmingham. 2008. “Toe-out gait in patients with knee osteoarthritis partially transforms external knee adduction moment into flexion moment during walking gait: A tri-planar kinetic mechanism.” *Journal of Biomechanics*. 41(2): 276-83.
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2. REFEREED CONFERENCE PROCEEDINGS

1. Ali S, **Asokanathan S F**, Wang T, Cho J, Lam C and Tharmabala T Structural Health Monitoring of Bridges via Low-cost Accelerometer-based Vibration data, *Proc. Cansmart 2007 – International Workshop on Smart materials and Structures*, Oct 2007, Montreal, pp. 257-265, Oct 2007.2
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3. **Asokanathan S F**, Cho J, Wang T and Chen Y Dynamic Analysis of MEMS-based Vibratory Angular rate Sensors via a Generic Reduced Order Model, *Proc. ASME 2007 International Design Engineering Technical Conferences*, Las Vegas, Paper # DETC 2007-35805, Sept-4-7, 2007.
4. Escoto, A., **Buchal, R.**, Factorial Experiment to Reduce and Characterize the Uncertainty of the FlatnessTolerance Measurement, CSME 2008 Forum, Ottawa, June 6-8. 2008.
5. **Buchal, R. O.**, Design and Innovation in Western's Integrated Engineering Program, Proceedings of the Canadian Design Engineering Network/ Canadian Conference on Engineering Education (CDEN/C2E2) 2007 Conference, Winnipeg, July 22-24, 2007 (paper and presentation)
6. **Buchal, R. O.**, Capstone Design in Mechanical Engineering at the University of Western Ontario, Proceedings of the Canadian Design Engineering Network/ Canadian Conference on Engineering Education (CDEN/C2E2) 2007 Conference, Winnipeg, July 22-24, 2007 (paper and presentation).
7. Mohammadi M., **Dryden J.R.**, "Effect of Spatial Variation of Poisson's Ratio on the Stresses in a Functionally Graded Ring", CSME Forum, Ottawa, June 2-7, 2008.
8. McLachlin SD, Beaton BJB, Sabo MT, Gurr KR, Bailey SI, Bailey CS, **Dunning CE**: Comparing the Fixation of a Novel Hollow Screw and a Conventional Solid Screw in the Human Sacra under Cyclic Loading, 54th Annual Meeting of the Orthopaedic Research Society, San Francisco, California, March 2, 2008. (poster)
9. McLachlin SD, Beaton BJB, Sabo MT, Gurr KR, Bailey SI, Bailey CS, **Dunning CE**: Comparing the Fixation of a Novel Hollow Screw and a Conventional Solid Screw in the Human Sacra under Cyclic Loading, Annual Meeting of the Canadian Spine Society, Sun Peaks Resort, BC, March 12, 2008. (poster)
10. McLachlin SD, Beaton BJB, Sabo MT, Gurr KR, Bailey SI, Bailey CS, **Dunning CE**: Comparing the Fixation of a Novel Hollow Screw and a Conventional Solid Screw in the Human Sacra under Cyclic Loading, 42nd Annual Canadian Orthopaedic Research Society Meeting, Quebec City, Quebec, June 4-7, 2008. (poster)
11. Sabo MT, McLachlin SD, Beaton BJB, Gurr KR, Bailey SI, Holdsworth DW, **Dunning CE**, Bailey CS: Comparing the Fixation of a Novel Hollow Screw versus a Conventional Solid Screw in the Human Sacra under Cyclic Loading, Annual Meeting of the Canadian Orthopaedic Residents Association, Quebec City, Quebec, June, 2008. (podium)

12. Austman RL, Milner JS, Holdsworth DW, **Dunning CE**: The Effect of Varying the Density-Modulus Relationship used to Apply Material Properties in a Finite Element Model of the Distal Ulna, 2008 Summer Bioengineering Conference (ASME), Marco Island, Florida, June 24-29, 2008. (poster)
13. "Thermally Modulated Flow in a Channel" by M.Fotia and **J.M. Floryan**, Bul. Amer. Phys. Soc., v.52, No.17, p.164, Nov.2007.
14. "On the transition between distributed and isolated surface roughness and its effect on the stability of channel flow" by **J.M. Floryan**, Bul. Amer. Phys. Soc., v.52, No.17, p.94, Nov.2007.
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16. "A Spectrally-accurate Gridless Method for Stokes Flow with Moving Boundaries" by S. Z. Husain and **J.M. Floryan**. Proceedings of the CSME Forum 2008, University of Ottawa, June 6-8, 2008.
17. "Analysis of Stability of Channel Flow Subject to Distributed Heating" by M. Z. Hossain, M. L. Fotia and **J. M. Floryan**. Proceedings of the CSME Forum 2008, University of Ottawa, June 6-8, 2008.
18. "Travelling Wave Instability in a Converging-Diverging Channel" by **J.M. Floryan** and C. Floryan, Proceedings of the 10th Pan American Congress of Applied Mechanics, Jan.7-11, 2008, Cancun, Mexico, ed.T.Attard, pp.312-315.
19. "Stability of Shear Layers in the Presence of Surface Roughness" by **J.M. Floryan**. Proceedings of the 10th Pan American Congress of Applied Mechanics, Jan.7-11, 2008, Cancun, Mexico, ed.T.Attard, pp.308-311.
20. "Use of Surface Corrugations for Flow Control" by **J.M. Floryan**, The Mechanics Conference to Celebrate the 100th Anniversary of the Department of Engineering Science and Mechanics, Virginia Polytechnic Institute and State University, Blacksburg, Va, USA, May 29-30, 2008.
21. TB Birmingham, PJ Fowler, RB Litchfield, KR Willits, D Bryant, **TR Jenkyn**, JR Giffin "Medial Opening Wedge HTO: A Prospective Cohort Study with 3D Gait Analysis and Minimum 2-Year Follow-up" Annual meeting of the American Orthopaedic Society for Sports Medicine San Francisco, CA, USA, March 8, 2008.
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24. **L.Y. Jiang**, An interfacial cohesive law for carbon nanotube-reinforced composites. 3rd Canadian Conference on Nonlinear Solid Mechanics, CanCNSM, University of Toronto, Canada, June 25-29, 2008.
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26. **Jiang, L.Y.** and Zhang, L. "The Nonlinear Fracture Analysis of Functionally Graded Piezoelectric Materials. CSME 2008, University of Ottawa, Canada, June 5-8, 2008.
27. Fraser G, Pichora J, Brownhill JR, Ferreira LM, **Johnson JA**, King GJW. Lateral Collateral Ligament Repair of the Elbow using Transosseous Sutures Restores Joint Kinematics and Stability. *Annual Meeting of the American Society for Surgery of the Hand*, Seattle, Washington, September, 2007.
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29. McDonald CP, King GKW, Peters TM, **Johnson JA**. An Anthropometric Study of the Distal Humerus with Implications Towards Contralateral Registration. *54th Annual Meeting of the Orthopaedic Research Society*, San Francisco, March, 2008.

30. Brownhill JR, Pollock JW, Ferreira LM, **Johnson JA**, King GJW. The Effect of Implant Constraint, Ligament Sectioning and Radial Head Management on Joint Loading in Total Elbow Arthroplasty. *54th Annual Meeting of the Orthopaedic Research Society*, San Francisco, March, 2008.
31. Brownhill JR, Pollock JW, Ferreira LM, **Johnson JA**, King GJW. The Effect of Humeral Component Malalignment on the Loading of Total Elbow Arthroplasty: An In-Vitro Study. *54th Annual Meeting of the Orthopaedic Research Society*, San Francisco, March, 2008.
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78. Nabavi, M., **Siddiqui, K.**, and Chishty, W., "Effects of Liquid Cross-flow Conditions on the Bubble Formation from a Submerged Gas Orifice", *CSME Forum* 2008, Ottawa, June 6-8, 2008.
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86. Bukhari, S.J.K., and **Siddiqui, K.**, "Non-intrusive temperature measurements beneath water surface during natural convection" ASME-JSME Thermal Engineering Conference, Vancouver, July 8-12, 2007.
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88. **A. V. Singh**, S. Kandasamy, Vibration Analysis of open shells of revolution, Sixth International Symposium on the Vibrations of Continuous Systems, Plump Jack Squaw Valley Inn, Olympic Valley, California, USA, July 23 – 27, 2007, p. 49 – 51.
89. Tanveer, M., **Singh, A. V.**, Transient response analysis of plates with eccentrically located patch loadings, Canadian Congress of Applied Mechanics CANCAM 07, Ryerson University, Toronto, Ontario, Canada, June 2007.
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98. P.S. Tomlinson, R.J. Klassen, **J.T. Wood**, M. Roy, "Numerical Modelling of a Flow Forming Process", ASME Applied Mechanics and Materials Conference, Austin, TX, 2007 (Invited)
99. P.S. Tomlinson, R.J. Klassen, **J.T. Wood**, M. Roy, "Numerical Strain Analysis of a Flow Forming Operation", 21st Canadian Congress of Applied Mechanics, Toronto, ON, 2007 (Invited)
100. M. Roy, R.J. Klassen, **J.T. Wood**, P.S. Tomlinson, "Strain Mapping of a Flow Formed Material", ASME Applied Mechanics and Materials Conference, Austin, TX, 2007 (Invited).
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103. J. Shao and **C. Zhang**, "Numerical Studies of Flow Past Two Side-By-Side Circular Cylinders," Computation in Modern Science and Engineering, Proc. International Conference of Computational Methods in Sciences and Engineering, Vol. 2, Part B, Eds. T.E. Simos and G. Maroulis, Corfu, Greece, September 25-30, pp. 1367-1370, 2007.

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107. S. A. Razzak, K. Agarwal, J. Zhu, and **C. Zhang**, "Numerical Simulations of an LSCFB Riser," *Proc. 18th International Symposium on Transport Phenomena, Daejeon, Korea, August 27-30, 2007, pp. 982-988.*
108. H. G. Hu and **C. Zhang**, "The Effect of Closure Correlations on the Simulation of Two-Phase Flows in Condensers," *Proc. 18th International Symposium on Transport Phenomena, Daejeon, Korea, August 27-30, 2007, pp. 989-996.*
109. R. Zhang, **C. Zhang** and J. Jiang, "Construction of Dynamic Models for an Air-Cooled CPU Chip Cooling Device," *ASME-JSME Thermal Engineering and Summer Heat Transfer Conference, Vancouver, Canada, July 8-12, Paper No. HT2007-32930, 2007.*

3. ORAL AND POSTER PRESENTATIONS

1. Escoto, A., **Buchal, R.**, Factorial Experiment to Reduce and Characterize the Uncertainty of the Flatness Tolerance Measurement, *CSME 2008 Forum, Ottawa, June 6-8. 2008.*
2. **Buchal, R. O.**, Design and Innovation in Western's Integrated Engineering Program, *Proceedings of the Canadian Design Engineering Network/ Canadian Conference on Engineering Education (CDEN/C2E2) 2007 Conference, Winnipeg, July 22-24, 2007 (paper and presentation).*
3. **Buchal, R. O.**, Capstone Design in Mechanical Engineering at the University of Western Ontario, *Proceedings of the Canadian Design Engineering Network/ Canadian Conference on Engineering Education (CDEN/C2E2) 2007 Conference, Winnipeg, July 22-24, 2007 (paper and presentation).*
4. Y Charles Lu, **Douglas M Shinozaki**, "Deep penetration microindentation testing of polymeric solids" Paper 30640, *McMat 2007, ASME Applied Mechanics and Materials Conference, University of Texas at Austin, June 3-7, 2008.*
5. A.L. Trejos, R.V. Patel and **M.D. Naish**, "A Sensorized Laparoscopic Instrument for Skills Assessment and Training," *Poster Presentation, Western Science and Engineering Research Day, London, ON, January 25, 2008.*
6. G.L. McCreery, A.L. Trejos, **M.D. Naish**, R.V. Patel and R.A. Malthaner, "Locating Tumours in Lung via Kinesthetic Feedback," *Poster Presentation, Western Science and Engineering Research Day, London, ON, January 25, 2008.*
7. M.T. Perri, D.A. Bottoni, G.L. McCreery, A.L. Trejos, **M.D. Naish**, R.V. Patel, and R.A. Malthaner, "Tactile Imaging System for Minimally Invasive Lung Tumour Localization," *Poster Presentation, Western Science and Engineering Research Day, London, ON, January 25, 2008.*
8. G.L. McCreery, A.L. Trejos, **M.D. Naish**, R.V. Patel and R.A. Malthaner, "Locating Tumours in Lung via Kinesthetic Feedback," *Podium Presentation (finalist), Lawson Health Research Institute Research Day, London, ON, March 26, 2008.*
9. M.T. Perri, D.A. Bottoni, A.L. Trejos, G.L. McCreery, **M.D. Naish**, R.V. Patel, and R.A. Malthaner, "New Tactile Imaging System for Minimally Invasive Lung Tumour Localization," *Poster Presentation, Lawson Health Research Institute Research Day, London, ON, March 26, 2008.*
10. **A.V. Singh**, S. Kandasamy, Vibration Analysis of open shells of revolution, *Sixth International Symposium on the Vibrations of Continuous Systems, Plump Jack Squaw Valley Inn, Olympic Valley, California, USA, July 23 – 27, 2007. (invited paper).*

11. Bahramian, F., **Straatman, A. G.**, Steinman, D. A., "Large Eddy Simulation of blood flow in stenosed arteries," *The 16th Annual Conference of the CFD Society of Canada*, Saskatoon, Saskatchewan, Canada, May 2008.
12. **Sun, X.** "Nanomaterials for Energy Applications", General Motors, US, Warren, Sept. 15, 2007.
13. **Sun, X.** "Nanotechnology for Clean Energy", Graduate student seminar of Department of Mechanical and Materials Engineering. Oct. 1, 2007.
14. **Sun, X.** "Nanotechnology for Clean Energy", plenary talk, Chinese National Materials Heat Treatment and Surface Engineering, Jia-Mu-Si, China, August 4-6, 2007.
15. **Sun, X.** "Nanotubes, Nanowires and Fuel Cells", Three talks, Harbin Institute of Technology, China, August 1-3, 2007.
16. Saha, M., Chen, Y., Liu, H., Li, R., **Sun, X.** "Novel Nitrogen-doped Carbon Nanotubes for PEM Fuel Cells", 91th Canadian Chemistry Conference, May 24-28, Alberta, Canada (2008).
17. Chen, Y., Liu, H., Li, R., **Sun, X.** "Nanotube-Based Electrodes for Fuel Cells", NanoForum Canada May 28-30, Alberta, Canada (2008).
18. Liu, H., Arato, D., Li, R., D., **Sun, X.**, Merel, P. "Aligned Multi-Walled Carbon Nanotubes Synthesized by Floating Catalyst CVD", Canadian Electrochemical Society, May 24, Alberta, Canada (2008).
19. Saha, M., Li, R., **Sun, X.** "Nanomaterials-based Electrodes for Fuel Cell Applications", Canadian Catalyst Conference, June 20 to 22, 2008, Kingston, Ontario, Canada.
20. "Solidification Porosity Modelling and Prediction of Magnesium Alloy Castings" J. Li and **J.T. Wood**. Light Metals Technology Conference, Saint-Sauveur, QC, 2007 (Invited).
21. "Numerical Modelling of a Flow Forming Process", P.S. Tomlinson, M. Roy, R.J. Klassen, **J.T. Wood**, ASME Applied Mechanics and Materials Conference, Austin, Texas 2007 (Invited).
22. "Strain Mapping of a Flow Formed Material", M. Roy, P.S. Tomlinson, R.J. Klassen, **J.T. Wood**, ASME Applied Mechanics and Materials Conference, Austin, Texas, 2007 (invited)
23. "Strain Mapping of Flow Formed 1020 Steel", M. Roy, R.J. Klassen, **J.T. Wood**, 19th Canadian Materials Science Conference, Hamilton, ON, 2007 (Invited).
24. "Two Dimensional Numerical Modelling of a Flow Forming Operation", P.S. Tomlinson, R.J. Klassen, **J.T. Wood**, 19th Canadian Materials Science Conference, Hamilton, ON, 2007 (Invited).
25. **C. Zhang**, "Numerical Studies of Flow Past Two Side-By-Side Circular Cylinders," *Computation in Modern Science and Engineering*, Proc. International Conference of Computational Methods in Sciences and Engineering, Vol. 2, Part B, Eds. T.E. Simos and G. Maroulis, Corfu, Greece, September 25-30, pp. 1367-1370, 2007.
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28. **C. Zhang**, "Air Flow and Solid Particle Deposition Patterns in a Lung Airway Model," Proc. 18th International Symposium on Transport Phenomena, Daejeon, Korea, August 27-30, pp. 2145-2151, 2007.
29. **C. Zhang**, "Numerical Simulations of an LSCFB Riser," Proc. 18th International Symposium on Transport Phenomena, Daejeon, Korea, August 27-30, pp. 982-988, 2007.
30. **C. Zhang**, "The Effect of Closure Correlations on the Simulation of Two-Phase Flows in Condensers," Proc. 18th International Symposium on Transport Phenomena, Daejeon, Korea, August 27-30, pp. 989-996, 2007.
31. **C. Zhang**, "Construction of Dynamic Models for an Air-Cooled CPU Chip Cooling Device," ASME-JSME Thermal Engineering and Summer Heat Transfer Conference, Vancouver, Canada, July 8-12, Paper No. HT2007-32930, 2007.

4. BOOK CHAPTERS

Barari, A., El Maraghy, H.A. and **Knopf, G.K.** "Evaluation of geometric deviations in sculptured surfaces using probability density estimation", in *Models for Computer Aided Tolerancing in Design and Manufacturing*, J. K. Davidson (Ed.), Springer Netherlands, pp. 135-146, 2007.

5. PATENTS

R.V. Patel, A.L. Trejos, M. Tavakoli and **M.D. Naish**, "Training and Skills Assessment System for Minimally Invasive Surgery," United States Provisional Patent, Number 61/006,443, filed January 2008.

Sun, X. Saha, M., Li, R. Zhou, Y. Liu, H., Zhong, Y, Cai, M. "Nanostructured Catalyst Supported on Metal Oxide Nanowires", US patent, pending, Sept, 2007.

Sun, X. Zhong, Y., Li, R., Cai, M. "Method of Synthesis of Al₂O₃ Nanostructures". US patent, pending, Nov., 2007.

PROFESSIONAL SERVICES

1. REVIEW OF REFEREED JOURNALS AND BOOK CHAPTERS

S.F. Asokanthan

ASME Journal of Applied Mechanics
Journal of Sound and Vibration
Journal of Vibration and Control
ASME Design Engineering Technical Conferences

R.O. Buchal

International Journal of Manufacturing Research

J.R. Dryden

International Journal of Solids and Structures

J.M. Floryan

International Journal of Numerical Methods in Fluids
Phys.Fluids
CASI Journal
Journal of Heat Transfer
Archives of Mechanics
Journal of Applied Mathematics
Heat Transfer Engineering
HEFAT 2008
22 IUTAM Congress
Journal of Fluid Mechanics

T.R. Jenkyn

Journal of Biomechanics
Arthritis and Rheumatism
Journal Biomechanical Engineering
Medical Physics

L.Y. Jiang

Journal of Physics D
Applied Physics
International Journal of Fracture
Engineering Fracture Mechanics
Proceedings of the Royal Society of London, series A
Acta Mechanica
ASME Journal of Applied Mechanics
ASME Journal of Engineering Materials and Technology
Archives of Mechanics

J.A. Johnson

The Journal of Shoulder and Elbow Surgery (Assistant Editor)
The Journal of Biomechanical Engineering
The Journal of Hand Surgery
The Journal of Orthopaedic Research
Clinical Orthopaedics and Related Research
Journal of Engineering in Medicine
Clinical Biomechanics
Journal of Biomechanics

R.E. Khayat

Journal of Fluid Mechanics
Physics of Fluids
International Journal of Numerical Methods Fluids
International Journal of Numerical Methods Heat Fluid Flow

R.J. Klassen

The Journal of Materials Processing Technology
The Canadian Metallurgical Quarterly
The Journal of Materials Science
The International Journal of Manufacturing Processes
Materials Science and Engineering
Scripta Materialia

G.K. Knopf

Biosensors and Bioelectronics
Optical Engineering
Optical Letters
International Journal of Optomechatronics (Associate Editor)
Journal of Intelligent Material Systems and Structures
Journal of Intelligent Manufacturing
International Journal of Advanced Manufacturing Technology
Control and Intelligent Systems (Associate Editor)
Computer-Aided Design
Engineering Computations

M.D. Naish

Journal of Robotics and Computer Integrated Manufacturing

E. Savory

Boundary Layer Meteorology
Journal of Wind Engineering and Industrial Aerodynamics

D.M. Shinozaki

Journal of Applied Polymer Science
Polymer

K. Siddiqui

Journal of Hydraulics Engineering
Journal of Wind Engineering and Industrial Aerodynamics
CSME Bulletin
International Journal of Heat and Fluid Flow
Measurement Science and Technology.

A.G. Straatman

International Journal for Numerical Methods in Fluids
ASME Journal of Biomechanical Engineering
International Journal of Heat and Fluid Flow
International Journal of Thermal Sciences

X.A. Sun

JACS
Nanotechnology
Materials of Chemistry
J. Phys. Chem. B
Electrochemistry Communication
Electrochemical Solid-State Letter
Appl. Phys. Lett.

J. Yang

Applied Physics Letter
Journal of Micromechanics and Microengineering
Biomacromolecules
Biomedical MaterialsLangmuir.

C. Zhang

International Journal of Computational Fluid Dynamics
International Journal of Computational Methods in Engineering Science and Mechanics
International Journal of Environment Studies
International Journal of Heat and Mass Transfer
Reviewer for Journal of Powder Technology

2. REVIEW OF GRANT APPLICATIONS

J.M. Floryan

Ontario Research Fund – Fuel Cell Network (2007-2010)
INCO + MMO (2007-08)
Natural Sciences and Engineering Research Council (Discovery)
Natural Sciences and Engineering Research Council (Strategic)

T.R. Jenkyn

Canada Foundation for Innovation
Canadian Institutes of Health Research
Natural Science and Engineering Research Council

L.Y. Jiang

SharcNet

J.A. Johnson

Natural Sciences and Engineering Research Council (Panel review- Committee 1053,
Mechanical Engineering) (*Chair and Reviewer, Attendee*)
Lawson Health Research Institute, Internal Research Fund Committee (*Internal Reviewer, Attendee*)

R.E. Khayat

Natural Sciences and Engineering Research Council (Discovery)
CNRS (National Research Council of France)

R.J. Klassen

Natural Sciences and Engineering Research Council (Discovery)

M.D. Naish

Ontario Ministry of Research and Innovation, Innovation Demonstration Fund

A.G. Straatman

Natural Sciences and Engineering Research Council (Discovery)

J. Yang

Natural Sciences and Engineering Research Council (Discovery)

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