



FIND FUTURE INNOVATIONS

through connecting to the premier international forum for
academic research and industrial applications in manufacturing!

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NAMRC 38

An International Forum

May 25-28, 2010

Kingston, Ontario CANADA

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Queen's
UNIVERSITY



NAMRI SME
The North American Manufacturing
Research Institution of SME

Dear Friends and Colleagues:

We are pleased to invite you to the Queen's University for the 38th Annual North American Manufacturing Research Conference (NAMRC)—the authoritative forum for applied research and industrial applications in manufacturing and design. NAMRC is a place where academic and industrial leaders interact to advance the study and processes of manufacturing.

Presentations and papers will continue to focus on manufacturing and design, and have also expanded to attract papers in Biomechanical, Life Cycle, and Micro/Nano concentrations. All accepted papers are published in the *Transactions of NAMRI/SME*, a strictly peer-reviewed volume.

In 2010, the conference will be hosted by Queen's University in Kingston, Ontario, Canada. This will be a homecoming for NAMRC, as one of the three founding members of NAMRC was the late Professor Bill Rice from Queen's University Mechanical Engineering.

Your participation in this event focusing on cutting-edge research in manufacturing is most welcome, and you'll benefit from peer-to-peer connections with others who have wide-reaching access and impact on manufacturing research.

We look forward to seeing you in Kingston!

Sincerely,

Dr. J. Jeswiet, PEng
Chair NAMRC 38, 2010
Professor
jeswiet@me.queensu.ca

Il Yong Kim, PhD
Co-chair NAMRC 38, 2010
Assistant Professor
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Sponsored by



North American Manufacturing Research Institution of SME
The International Academy for Production Engineering
The Canadian Society of Mechanical Engineers

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Mechanical & Materials Engineering • Queen's University • Kingston, Ontario, Canada
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Manufacturing Innovations and NAMRC

NAMRC is an international forum for the presentation and critical discussion on innovations in the results of basic and applied research in material forming, material removal, and manufacturing systems and controls. It is one of only a few events of its kind where technical innovations, new methods and applications of leading-edge technology from throughout the world are shared among manufacturing research, design, engineering and production professionals from academia and industry. Because NAMRC takes place every year, the findings and breakthroughs presented here are topical and of current interest.

Why Should You Attend?

- GAIN insight on the most recent developments in material removal and forming processes, automation and control of processes and systems, equipment accuracy and precision and many other manufacturing-related topics;
- Participate in a DIALOGUE between industry and academia on future needs for manufacturing processes and applications;
- ENHANCE your knowledge of alternative manufacturing processes and applications;
- Make valuable CONTACTS with other leading manufacturing researchers and professionals;
- All full paid regular attendees will receive a FREE copy of the official conference publication — *Transactions of NAMRI/SME, Volume 38, 2010*.



Conference Site & Facilities

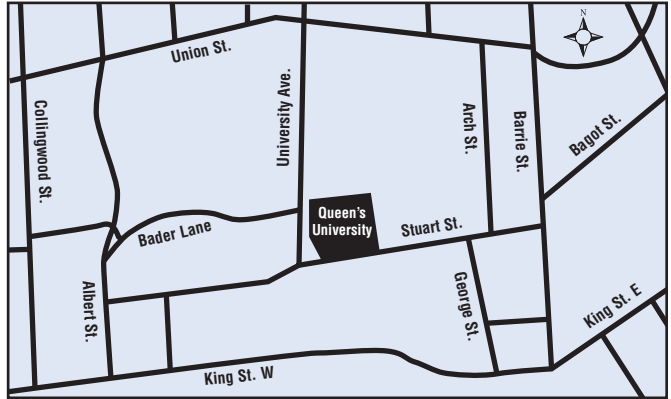
Queen's University at Kingston was established by Royal Charter of Queen Victoria in 1841. It was the earliest degree-granting institution in the United Province of Canada, and the first to establish a student government. Honorary degree recipients include: HRH Prince Charles, President Franklin Delano Roosevelt, Governor General Roland Michener and many leaders of industry.

Queen's is located in the heart of the famous 1000 Islands tourist district. If you are interested in history, culture, the 1000 Islands, sailing, canoeing, hiking or enjoying quality restaurants and sidewalk café culture, we have it all. The Queen's Art Gallery also has two Rembrandts and many of his sketches for you to view.

Queen's Engineering students have one of the oldest representative bodies for engineering students in Canada. EngSoc, as it is known, was formed in 1897. The spirit of Queen's MME students can be seen in many activities such as the Aero Design Team, Autonomous Sailboat Team (NorthStar), Formula SAE Team, Mini Baja Team and Solar Car Team.



99 University Avenue
Kingston, Ontario
Canada
K7L 3N6



Go to www.queensu.ca/conferences/namrc for a detailed online map and directions.

Special Activities

- NAMRI/SME Board Meeting, Tuesday, May 25, from 8:30 a.m. to 3:30 p.m. at Queen's Mechanical and Materials Engineering, Room 312, McLaughlin Hall.
- Welcoming Reception and Registration on Tuesday, May 25, 6:00 to 8:00 p.m., Leggett Hall Fireside Room.
- Welcoming Ceremony & Panel on Connecting Research to Education, Wednesday, May 26, to 8:30 to 10:00 a.m. in Chernoff Hall Theatre 250.
- NAMRI/SME Awards Luncheon on Wednesday, May 26, from 12:30 to 2:00 p.m. in Ban Righ Dining Room.
- NAMRC Banquet on Wednesday, May 26, 7:00 to 9:30 p.m., Ban Righ Dining Room.
- Founders Lecture by Yoram Koren on Thursday, May 27, from 12:30 to 2:00 p.m., Ban Righ Dining room.
- NAMRI/SME Membership Meeting on Thursday, May 27, 4:00 to 5:00 p.m., Chernoff Hall Theatre 250.
- ASME/MED Membership Meeting on Thursday, May 27, 5:00 to 6:00 p.m., Chernoff Hall Theatre 250.
- Fort Henry Spirit Tasting (Optional) on Thursday, May 27, 7:00 to 9:30 p.m.
- Companion program: Agnes Etherington Art Centre, lunch, Bellevue House, banquet, Fort Henry, lunch, Kingston Mills, MacLachlan Woodworking Museum, lunch.

Topics of Discussion

One hundred papers were accepted from more than 15 countries around the world, making this year's event the definitive international connection to manufacturing research.

Total Accepted Papers: 100

Topics Addressed:

- Abrasion
- Cutting
- Environmental
- Innovative Manufacturing
- Machining
- Manufacturing Systems
- Metal Forming
- Nontraditional Abrasives
- Processes
- Quality
- Sensors
- Miscellaneous

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What's Being Discussed

CUTTING

2D Cutting Simulations with Diamond-Coated Tools
F. Qin and K. Chou

New Design of Quick Stop Device for Research on Chip Formation
R. Bejjani, M. Balazinski, H. Attia, and B. Shi

Predicting Residual Stress Profiles in Hard Turning without Chip Formation
S. Anurag, Y.B. Guo, and Z.Q. Liu

Chip Formation in Circular Micro-End-Milling
A. Banerjee and E.V. Bordatchev

Cutting Edge Geometry of Uncoated and Coated Tools by Optical Profilometry
A. Ogilvie, K. Chou, M. Ashford, and E. Novak

Effects of Orthogonal Machining of AISI 52100 Steel
A.D. Jayal, D. Umbrello, O.W. Dillon, Jr., and I.S. Jawahir

Artificial Neural Networks Based Prediction of Friction Coefficient
I.M. Deiab and H.A. Kishawy

B-Spline Based General Force Model for Broaching
A. Hosseini and H.A. Kishawy

Nanocomposite Cutting Tool Coating for Turning Nodular Cast Iron
W. Jiang and A.P. Malshe

Cutting Fluid System Based on Ultrasonic Atomization for Micro-Machining
M. Rukosuyev, C.S. Goo, M.B.G. Jun, and S.S. Park

Gun-Drilling MQL Process and Tooling for Compacted Graphite Iron (CGI) Machining
J.S. Agapiou

Drilling Holes in CFRP Composite Laminates Using a Router Tool
S. Subbiah and S. Idapalapati

Overcut in Electrochemical Micromachining for 304 Stainless Steel
R. Thanigaivelan and R.M. Arunachalam

Finite Element Simulation of High Speed Machining Ti-6Al-4V Alloy
T. Ozel, M. Sima, and A.K. Srivastava

GA Based Optimization for Determining Johnson-Cook Material Parameters
L. Pang, H.A. Kishawy, and M. Balazinski

Using Modulated Machining to Generate Micro and Sub-Micro Scale Periodic Surfaces
S. Shekhar, S. Abolghasem, S. Basu, J. Cai, and M.R. Shankar

Incorporating Stability, Surface Location Error, Tool Wear, and Uncertainty in the Milling Super Diagram
J. Karandikar, R.E. Zapata, and T.L. Schmitz

In-Process Prediction of Surface Roughness by Utilizing the Cutting Force Ratio
S. Tangitsitcharoen

Micro Rotary Ultrasonic Machining
A. Sarwade, M.M. Sundaram, and K.P. Rajurkar

MQL with Nanographene-Enhanced Lubricants Ball-Milling
K. Park, J. Shantanu, P. Kwon, L. Drazl, and I. Do

Wear Compensation Strategies in Multi-Machine Cells with CMM Feedback
T. Bering and S.C. Veldhuis

Tool Wear in Drilling of Composite/Titanium Stacks with Carbide and PCD Tools
K-H. Park, P. Kwon, G. Castro, D-W. Kim, and J. Lantrip

Tool Wear Characteristics of Micro Milling of Optical Glass
T. Ono

High Performance Machining of Hardened Steel Using CBN Cutting Tools
H.R. Siller, C.A. Rodriguez, C. Vila, and J.V. Abellán

Laser Pulse Overlap on Machined Depth and Surface Roughness
T.A. Davis and J. Cao

Burr Removal Difficulties in Gas Turbine Engine Components
B. Petz, F. Xi, and S. Engin

Johnson-Cook Material Model Constants for AISI 4340 HR by Metal Cutting
A. Deshpande, V. Madhavan, and M. Al-Bawaneh

Strain Rate and Flow Stress While Machining Hot Rolled AISI 4340
K. Srinivasan and V. Madhavan

Failure Mechanisms in Micro-Milling of Aligned Carbon Fiber Reinforced Polymers
K.A. Calzada, J. Samuel, S.G. Kapoor, R.E. DeVor, A.K. Srivastava, and J. Iverson

Compensation of Compliance Errors in Machining
R. Guaiassa and J.R.R. Mayer

Comparison of Correlation Methods for Profile Measurements
K.W. Krueger and T.R. Kurfess

FORMING

Hydro/Pneumatic Sheet Metal Forming Operations Through Reverse Bulging
F. Abu-Farha and M. Nazzal

Hot Stamping Tailor Welded Blanks in Lightweight Components
J. Lechler, T. Stoehr, A. Kuppert, and M. Merklein

Detection and Diagnosis of Repetitive Surface Defects for Hot Rolling Processes
Q. Li, J. Jin, and T-S. Chang

Cruciform Specimen Geometries for Warm and Elevated Temperature Biaxial Testing
F. Abu-Farha and L. Hector, Jr.

Clearance and Embedding Depth of Force Sensors for Monitoring Forming Process
S. Sah and R.X. Gao

Effect of Tool Rotation on the Joint Strength of Cold-Work Die Steel by Friction Stir Welding
H. Sano, N. Nakayama, and H. Takeishi

Industrial Applications of Friction Stir Welded T-Joints of Different Materials
G. Buffa, L. Fratini, and F. Micari

Deep Drawing of 5052 Aluminum Strips Using Electrically-Assisted Manufacturing (EAM)
T.J. Collins and J.T. Roth

Empirical Modeling of the Stress-Strain Relationship Under Direct Electrical Current
J.J. Jones, L. Mears, and J.T. Roth

Energy Based Modeling of an Electrically-Assisted Forging Process
C. Bunget, W.A. Salandro, L. Mears, and J.T. Roth

Experimental Analysis of Micro Tube Hydroforming Process
K. Ng, S. Wagner, J.A. Camello, and W. Emblom

Fabrication of Nanostructured Materials by Shot Peening Steel and Aluminum Alloys
R. Waikar, Y.B. Guo, and K.A. Woodbury

Experimental Investigation of Ironing with Polymer Laminated Steels
M.A. Sellés-Cantó, V.J. Seguí-Llinares, and S.R. Schmid

Safe and Defect Regions in Analytical Sheet Metal Forming Failure Criteria
J.F. Wilson, K. McLaughlin, and B.L. Kinsey

Hybrid Knowledge System for Rolling Process of DP Steels
L. Madej, L. Rauch, and M. Pietrzyk

Improving Computational Efficiency and Stability of Material Models in Metal Powder Compaction
H.K. Zadeh, I.Y. Kim, and J. Jeswite

Predictive Modeling of Compaction Density in Powder Metallurgy Components
E. Jafar-Salehi and A. Ghasempour

Influence of Geometrical Parameters on Material Welding in Porthole Die Extrusion
E. Ceretti and C. Giardini

Optimization of Localized Annealing for Preform Anneal Forming of Aluminum Alloys
J. Li, Y. Zhou, S.J. Hu, L.E. Izquierdo, P.E. Krajewski, and T.M. Lee

High Strength Steel Behavior During Hot Stamping Operations
P.F. Bariani, A. Ghiotti, and S. Bruschi

Ten Parameter Screening of the Single Point Incremental Forming Process
A.F. Nagy-Sochacki, R. Gresham, and S. Kalayanasundaram

The Orange Peel Effect in Single Point Incremental Forming
K. Hamilton and J. Jeswiet

Development of a Strain Model for an Oval Aluminum Stamp Formed Pan
N.S. Kulkarni, W.J. Embloom, T.A. Kozman, J. Lee, and K.J. Weinmann

Using FEA Simulation to Design Multi-Stage Micro Dies to Form Stainless Steel 304 Micro Tubes
J-T. Gau, P.K. Paritala, and M-H. Wu

Aerospace Aluminum Alloys AA2024 and AA7075 Under Warm Hydroforming
G. Parekh, S. Hall, and M. Koç

Sheet Metal Forming Tools Made from Nodular Cast Iron
P. Groche, M. Engels, and C. Müller

Micro-Dimple Forming for Inner Surface of Pipe
M. Futamura, K. Dohda, T. Makino, and T. Suzuki

A Framework for Predicting Subtle Surface Distortion in Sheet Metal Flanging
Y. Huang, N. Mahayotsanun, J. Cao, W. Lee, H.P. Wang, and S. Xu

Effect of Carbon Nanofiber's Volume Ratio on Frictional Property and Mechanical Property
S. Tokutake, N. Nakayama, H. Takeishi, and T. Matsuura

Comparison of Dimensional Repeatability of Deformation Machined Components
A. Agrawal, J. Ziegler, S. Smith, B. Woody, and J. Cao

GRINDING

Improved Grinding Process Integrated with Induction Heating Technology
L. He, X. Li, G. Wang, and Y. Rong

Additive Effects Applied in Electrolyte Optimization for Electrolytic In-Process Dressing (ELID) Grinding
N. Lou, I.D. Marinescu, and M.C. Weismiller

Experimental Characterization of Meso-Scale Grinding Process Using Compressed Chilly Air
P-H. Lee and S.W. Lee

Influence of Kinematics on Lapping and Lap Wear
A. Fang, S. Zhou, and M. Sabados

Optimization of D2 Steel Lapping with Tribological Designed Plate
Y. Zhang, I.D. Marinescu, and R. VandenBoom

Graphite Nanoplatelet-Enhanced Fluid in Reduced Quantity Lubrication Centerless Grinding
S. Dzebo, J. Morehouse, K. Kalaitzidou, and S. Melkote

Reliability Analysis of Mass Finishing Processes
V. Cariapa, H. Park, and C. Cheng

Ferrous Tools in Internal Surface and Edge Finishing of Flexible Capillary Tubes by Magnetic Abrasive Finishing
H. Yamaguchi and J. Kang

Nanolubricant Integrated Soybean Oil for Minimum Quantity Lubrication (MQL) Grinding
P. Kalita, A.P. Malshe, and W. Jiang

MANUFACTURING SYSTEMS & ENVIRONMENT

A Comparison of Carbon Emission Calculators for Manufacturers
P. Nava, J. Jeswiet, D.C. Diarra, J. Barwick, and K. Young

Carbon Emissions in Metal Forming with Eco-Benign Lubrication
P. Nava, J. Jeswiet, and I.Y. Kim

Societal Sustainability in Manufacturing Enterprise Decisions
M.J. Hutchins, J.S. Gierke, and J.W. Sutherland

Energy Consumption and CO₂ Emissions for Manufacturing Compressed Air Systems
D.C. Diarra, J. Jeswiet, B. Astle, and D. Gawel

Power Consumption Study in Knife Milling of Wheat Straw
T.W. Deines and Z.J. Pei

SENSORS

A Multidimensional Acceleration Sensor Based on 3RRPRR Decoupling Parallel Mechanism
Z. Gao and D. Zhang

Six-Dimensional Wrist Force/Moment Sensor for Underwater Manipulators
Q. Liang, D. Zhang, Z. Chi, Q. Song, and Y. Ge

Design of Surface Metrology Systems
C.A. Brown and B. Powers

Multisensor Assessment of Manufacturing Processes Performance
D. Djurdjanovic, R. Kegg, J. Lee, and J. Ni

Quality Inspection of Oilfield Equipment Using Nondestructive Examination
J.R. Boudreaux, J. Lee, W.J. Embloom, and T.A. Kozman

Diagnosis of Multiple Error Sources Under Variation Equivalence
S. Chen, H. Wang, and Q. Huang

CONTROLS

A New Algorithm for Motion Planning of Fixture Loading
X. Kang and Q. Peng

ROBOTICS

Reconfigurable Four Degrees of Freedom Modular Serial Robot System
D. Zhang, J. Lei, Q. Shi, and Z. Song

Using the Neural Network Method to Solve Forward Kinematics
D. Zhang, Q. Shi, and J. Lei

OPTIMIZATION

Artificial Immune System Optimization Approach within an Online Platform
F.F. Chen and M. Bachlaus

OTHER

Extraction and Classification of Surface Defects in Continuous Casting
Q. Yang, J. Jin, and T-S. Chang

Continuous Manufacturing of Aligned Carbon Nanotube Films
E.S. Polsen, S. Tawfick, E.R. Meshot, and A.J. Hart

Mixing and Loading of Carbon Nanofiber on Polyetherimide Nanofoams
N.J. Vaccaro, W. Li, B. Li, and W.H.K. Zhong

Dispenser Printing for Prototyping Microscale Devices
P.K. Wright, D.A. Dornfeld, A. Chen, C.C. Ho, and J.W. Evans

Electrochemical Discharge Machining Using Micro-Drilling Tools
C. Wei, J. Ni, and D. Hu

Geometric Tolerance Simulation for Rectangular and Circular Planar Features
W. Huang, B.R. Konda, and Z. Kong

High-Definition Metrology Diagnosis Using 2-D Discrete Cosine Transform
X. Lu, H. Wang, and S.J. Hu

Identification of Scale and Squareness Errors on a CMM
A. Nafi and J.R.R. Mayer

Improving Consistency of Wooden Musical Instruments Through Frequency Matching
P. Dumond and N. Baddour

Modeling of Microchannel Buckling Due to Thermal Stresses During Diffusion Bonding
G.K. Lingam and B.K. Paul

Two-Stage Hybrid Adaptive Assembly Layout Planning
S. Keshavarzmanesh, L. Wang, and H-Y. Feng

Compression of Proton Exchange Membrane Fuel Cells
Y. Zhou

Tissue Oblique Cutting Flow Angle and Needle Insertion Contact Length
J.Z. Moore and A.J. Shih

NAMRC 38 Program-at-a-Glance

Hosted by Queen's University

Building and room information will be made available closer to the conference date.

Check online at: www.queensu.ca/conferences/namrc

Tuesday May 25	Wednesday May 26	Thursday May 27	Friday May 28
NAMRI/SME Board Meeting 8:30 a.m. – 3:30 p.m.	Registration 7:15 – 8:30 a.m.	Registration 7:15 – 8:30 a.m.	Registration 7:15 – 8:30 a.m.
Casual Reception and Registration 6:00 – 8:00 p.m.	Welcoming Ceremony & Panel 8:30 – 10:00 a.m.	Environment Session 8:30 – 10:00 a.m.	Education Session 8:30 – 10:00 a.m.
	Morning Break 10:00 – 10:30 a.m.	Morning Break 10:00 – 10:30 a.m.	Morning Break 10:00 – 10:30 a.m.
	Concurrent sessions 10:30 a.m. – 12:30 p.m.	Concurrent sessions 10:30 a.m. – 12:30 p.m.	Concurrent sessions 10:30 a.m. – 12:30 p.m.
	Awards Luncheon 12:30 p.m. – 2:00 p.m.	Founders Lecture and Luncheon 12:30 p.m. – 2:00 p.m.	Closing Ceremony 12:30 p.m. – 2:30 p.m.
	Concurrent sessions 2:00 – 3:30 p.m.	Concurrent sessions 2:00 – 3:30 p.m.	
	Afternoon Break 3:30 – 4:00 p.m.	Afternoon Break 3:30 – 4:00 p.m.	
	Concurrent sessions 4:00 – 6:00 p.m.	NAMRI/SME Membership Meeting 4:00 – 5:00 p.m.	
	Banquet 7:00 – 9:30 p.m.	ASME/MED 5:00 – 6:00 p.m.	
		Fort Henry Spirit Tasting (Optional)* 7:00 – 9:30 p.m.	

*The Fort Henry Tour is offered for an additional \$50 (tax included) and includes a spirits tasting and transportation.

REGISTER BY APRIL 15 AND SAVE! www.queensu.ca/conferences/namrc/?page=Registration

Registration fees include entrance to all technical sessions, all conference materials, publications, and meal functions (this excludes Fort Henry Spirits Tasting on Thursday night). Students and Retirees will not be provided with a hard copy of the *Transactions of NAMRI/SME*.

For questions regarding registration, including offline registration and cancellation, please contact:

Maggie Doris
Queen's Event Services
613.533.6000, ext. 74031
dorism@queensu.ca

All funds shown below are in Canadian dollars and Canadian taxes are included (PST 8%, GST 5%).

Register **BEFORE** April 15, 2010

SME member \$590
Nonmember \$600
Student/Retiree \$400
Companion Program \$300

Register **AFTER** April 15, 2010

SME member \$690
Nonmember \$700
Student/Retiree \$400
Companion Program \$300

Cancellation Refund

Before May 5, 2010* \$300
All prices include applicable taxes (13%).
*No refund after May 5, 2010

Stay Up-to-Date

Get all the upcoming details on the Companion Program, travel & hotel accommodations, dining, and local Kingston area attractions on the NAMRC 38 Web site at www.queensu.ca/conferences/namrc.



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