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

Plan to attend
NAMRC 38
An International Forum
May 25-28, 2010
Kingston, Ontario CANADA
www.queensu.ca/conferences/namrc

Hosted by
Queens University

SME Society of Manufacturing Engineers
NAMRI The North American Manufacturing Research Institute 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
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Il Yong Kim, PhD
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Assistant Professor
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North American Manufacturing Research Institution of SME
The International Academy for Production Engineering
The Canadian Society of Mechanical Engineers

www.queensu.ca/conferences/namrc
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.
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.

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

www.queensu.ca/conferences/namrc
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. Tangjitkitsiriathoon
Micro Rotary Ultrasonic Machining A. Sarwade, M.M. Sundaram, and K.P. Rajurkar
Wear Compensation Strategies in Multi-Machine Cells with CMM Feedback T. Bering and S.C. Veldhuis
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
Compensation of Compliance Errors in Machining R. Guisata and J.R.R. Mayer
Comparison of Correlation Methods for Profile Measurements K.W. Krueger and T-R. Kurfess
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 Join 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. Cameliol, and W. Emblem
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. Jeswiet
Predictive Modeling of Compaction Density in Powder Metallurgy Components E. Jafar-Salehi and A. Ghasempoor
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. Ghriott, and S. Bruschi

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

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. Ehlom, T.A. Kozman, J. Lee, and R.J. Weinmann

Using FEA Simulation to Design Multi-Stage Micro Dies to Form
Stainless Steel 304 Micro Tubes
F.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

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

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

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

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

MANUFACTURING SYSTEMS & ENVIRONMENT
A Comparison of Carbon Emission Calculators for Manufactures
P. Nava, J. Jeswiet, J.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. Gavel

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

SENSORS
A Multidimensional Acceleration Sensor Based on 3RRPR 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. Ehlom, 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. Pelsen, S. Tawfick, E.R. Meshot, and A.J. Hart

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

Dispenser Printing for Prototyping Microscale Devices
P.K. Wright, D.A. Dornfield, 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](http://www.queensu.ca/conferences/namrc)

### Tuesday May 25
- **NAMRI/SME Board Meeting**  
  8:30 a.m. – 3:30 p.m.
- **Casual Reception and Registration**  
  6:00 – 8:00 p.m.

### Wednesday May 26
- **Registration**  
  7:15 – 8:30 a.m.
- **Welcoming Ceremony & Panel**  
  8:30 – 10:00 a.m.
- **Morning Break**  
  10:00 – 10:30 a.m.
- **Concurrent sessions**  
  10:30 a.m. – 12:30 p.m.
- **Awards Luncheon**  
  12:30 p.m. – 2:00 p.m.
- **Concurrent sessions**  
  2:00 – 3:30 p.m.
- **Afternoon Break**  
  3:30 – 4:00 p.m.
- **Concurrent sessions**  
  4:00 – 6:00 p.m.
- **Banquet**  
  7:00 – 9:30 p.m.

### Thursday May 27
- **Registration**  
  7:15 – 8:30 a.m.
- **Environment Session**  
  8:30 – 10:00 a.m.
- **Concurrent sessions**  
  10:30 a.m. – 12:30 p.m.
- **Founders Lecture and Luncheon**  
  12:30 p.m. – 2:00 p.m.
- **Concurrent sessions**  
  2:00 – 3:30 p.m.
- **NAMRI/SME Membership Meeting**  
  4:00 – 5:00 p.m.
- **ASME/MED**  
  5:00 – 6:00 p.m.
- **Fort Henry Spirit Tasting** (Optional)*  
  7:00 – 9:30 p.m.

### Friday May 28
- **Registration**  
  7:15 – 8:30 a.m.
- **Education Session**  
  8:30 – 10:00 a.m.
- **Morning Break**  
  10:00 – 10:30 a.m.
- **Concurrent sessions**  
  10:30 a.m. – 12:30 p.m.
- **Closing Ceremony**  
  12:30 p.m. – 2:30 p.m.

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

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### REGISTER BY APRIL 15 AND SAVE!
[www.queensu.ca/conferences/namrc/?page=Registration](http://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*.

**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](http://www.queensu.ca/conferences/namrc).

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

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dorism@queensu.ca

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