

The North American Manufacturing Research Institution of the
Society of Manufacturing Engineers invites you to attend the

*Thirty-second North American
Manufacturing Research Conference*

NAMRC 32



June 1-4, 2004
Charlotte, North Carolina,
USA

Hosted by

**University of North Carolina
at Charlotte**

William States Lee College of Engineering
Mechanical Engineering Department
Center for Precision Metrology
Charlotte Research Institute
Charlotte, North Carolina, USA

NAMRI 

The North American Manufacturing
Research Institution of the
Society of Manufacturing Engineers

SME/Greenfield
Coalition Workshop
on Learning Resources

June 4-5, 2004

Dear Colleagues and Friends:

We welcome you to the Thirty-second Annual North American Manufacturing Research Conference. NAMRC is an established international forum for the presentation and critical discussion of research results and applications generated throughout universities and industry. Leaders in manufacturing research come to this conference to exchange findings and leading edge technological information. Participation in NAMRC 32 provides the authors far-reaching recognition of their work and yields valuable insight from other leaders in manufacturing research.

This year 81 technical papers will be presented at the conference by researchers from universities, research institutes, and industrial research laboratories located around the world. All of these complete manuscripts have been accepted for presentation at and publication in the Transactions of the conference based upon a stringent peer review process conducted by the Scientific Committee of the North American Manufacturing Research Institution of the Society of Manufacturing Engineers (NAMRI/SME).

While participating in NAMRC 32 in Charlotte, you will be visiting one of the most rapidly growing economic regions in the US. In addition, our Charlotte Research Institute (CRI) houses the Center for Precision Metrology, the Center for Optoelectronics and Optical Communications, the Global Institute for Energy and Environmental Systems, and the eBusiness Technology Institute. Tours of these facilities are available, and we also offer a full social program with many opportunities to meet colleagues and learn about the Carolinas region. Please feel free to contact me if you have any questions about NAMRC 32 Conference.

We look forward to seeing you in Charlotte!

Regards,

Bob Wilhelm

NAMRC 32 Conference Co-Chair

*The University of North Carolina at Charlotte
Charlotte, NC, USA*

Scott Smith

NAMRC 32 Conference Co-Chair

*The University of North Carolina at Charlotte
Charlotte, NC, USA*

The Society of Manufacturing Engineers is the world's leading professional society supporting manufacturing education. Through its member programs, publications, expositions, and professional development resources, SME promotes an increased awareness of manufacturing engineering and helps keep manufacturing professionals up to date on leading trends and technologies. Headquartered in Michigan, SME influences more than half a million manufacturing engineers and executives annually. The Society has members in 70 countries and is supported by a network of hundreds of chapters worldwide. Visit us at www.sme.org.

Membership in NAMRI/SME

Senior or Affiliate membership in SME is necessary before an individual can be considered for membership in NAMRI/SME. Membership grades include Senior Member and Student Member.

Election to Senior Member requires approval of the NAMRI/SME Board of Directors. The candidate should complete an application demonstrating active participation in manufacturing or manufacturing research.

Student member grade requires an application demonstrating the SME qualification for student membership. Attendance at the annual NAMRC is also required.

Use the NAMRI/SME membership form located in the center of the brochure to apply. The membership form is also available on line at www.sme.org/namri.

What is NAMRC

NAMRC is an international forum for the presentation and critical discussion of the results of basic and applied research related to manufacturing and technology development. 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?

By attending NAMRC 32, you will:

- 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.

About NAMRI/SME

The North American Manufacturing Research Institution of the Society of Manufacturing Engineers (NAMRI/SME) is an organization dedicated to manufacturing research and technology development. Its mission is to advance manufacturing engineering by promoting research and its application in industry. To learn more about NAMRI/SME or to become a member, visit the website at www.sme.org/namri.

Sponsorship

The NAMRC 32 Organizing Committee thanks the William States Lee College of Engineering, the Mechanical Engineering Department, the Center for Precision Metrology, and the Charlotte Research Institute for their sponsorship of this conference.

Conference Publication

Papers accepted for and presented at NAMRC 32 will be contained in the hardbound Transactions of the North American Manufacturing Research Institution of SME, Volume 32, 2004. Participants who have paid the registration fee will receive a copy at the time of registration. Additional copies may be purchased by contacting an SME Customer Service Representative at (313) 271-1500, ext. 4500 or (800) 733-4763.

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University of Maryland

Conference Site & Facilities

The NAMRC Conference will be held on the main campus of The University of North Carolina at Charlotte and Hilton Charlotte University Place.

The University is minutes from Uptown Charlotte and the activities that a major city has to offer. The conference hotels, Hilton University and the Marriott Residence Inn, are both situated within three miles of campus. Shuttle bus service will be provided daily to and from the University and the hotels.

UNC Charlotte's campus is tucked into the wooded landscape between Highways 29 and 49. An abundance of area attractions such as, the N.C. Blumenthal Performing Arts Center; Lowe's Motor Speedway (hosting three NASCAR Cup races each year); Daniel Stowe Botanical Gardens; Discovery Place; and the Charlotte Symphony, receive thousands of area residents from the 14 counties of the metropolitan region.

UNC Charlotte is a doctoral research-intensive university and the fourth largest of the 16 institutions in the University of North Carolina system. Opened September 23, 1946, UNC Charlotte is considered one of the best public regional universities in the Southeast. Its 1,000-acre campus is located in Charlotte's northern region called University City. The current student population is 18,000. Alumni total 60,000 and grows by 3,000 - 3,500 each year.

The Charlotte community and the Carolinas benefit from the University's commitment to research and service through such agencies as the Charlotte Research Institute, UNC Charlotte Uptown, the C.C. Cameron Center for Applied Research, the Center for Precision Metrology, the eBusiness Technology Institute, the Center for Optoelectronics and Optical Communications, the Global Institute for Energy and Environmental Systems, the Center for Transportation Policy Studies, UNC Charlotte Urban Institute, the Center for Applied and Professional Ethics, and Continuing Education, Extension and Summer Programs.

Special Activities

In connection with NAMRC 32:

- NAMRI/SME Board Meeting, Tuesday June 1 from 8:30 a.m. - 5:30 p.m., Hilton Hotel
- Welcoming Reception & Registration on Tuesday, June 1 from 5:30 p.m. - 8 p.m. at the Hilton Hotel
- Welcoming Ceremony and Keynote Address by Dr. Jimmy Williams, Director of Development at Alcoa Technical Center, on June 2 from 8:30 a.m. - 10 a.m.
- NAMRI/SME Awards Luncheon and Founders Lecture on Wednesday, June 2 from Noon - 2:00 p.m.
- COMEC Session and Meeting on Wednesday, June 2 from 2:00 p.m. - 6:00 p.m.
- NAMRC Banquet on Wednesday, June 2 from 7 p.m. - 10 p.m. at Oehler's BBQ
- NAMRI/SME and ASME/MED membership meetings on Thursday, June 3 from 4 p.m. - 6 p.m.
- NAMRC Reception on Thursday, June 3 from 6:30 p.m. - 10 p.m. at the Hilton Hotel
- SME/Greenfield Coalition Learning Resources Workshop Friday afternoon through Saturday Noon, June 4-5 at the Hilton Hotel.

Laboratory and Campus Tours

June 2 & 3, 4 p.m. - 6 p.m.

Center for Precision Metrology

The Center for Precision Metrology is located in the Cameron Applied Research Center on the campus of the University of North Carolina at Charlotte. The Center for Precision Metrology is a synergistic association of interdisciplinary UNC Charlotte researchers allied with industry; dedicated to research, application, integration, and education in areas of design, manufacturing, processes, and controls relating to precision metrology. In order to sustain research, development, and training in metrology, facilities are maintained to manufacture components at the required levels. For critical measurement, many instruments are housed in a 1500 sq. ft. controlled environment, $20^{\circ} \pm 0.1^{\circ}$ C, class 10,000 metrology laboratory. Other laboratories include computer-aided design, manufacturing, and modeling, precision motion systems, precision electro-optical systems, mechatronics, scanned probe microscopes, and instrument development, supported by a precision machine shop and an electronics shop.

Hendrick Motor Sports

The Hendrick Motorsports racing complex is located in Charlotte, N.C., very close to Lowe's Motor Speedway. This sophisticated complex provides facilities to design, test and make cars and engines for all of the Hendrick race teams. All HMS racecars are constructed start-to-finish at the 70+ acre complex, and more than 700 engines are built on-site each year. Visitors are welcome to view Terry Labonte's Kellogg's/got milk? Race Shop, Jeff Gordon's DuPont Race Shop, Jimmie Johnson's Lowes Motorsports Race Shop, Joe Nemechek's UAW-Delphi Motorsports Race Shop, Brian Vicker's GMAC Racing Shop, and the Hendrick Motorsports Chassis building facility. Visitors are also welcome to view the 15,000-square-foot Hendrick Museum and Speed Shop that showcase almost two decades of HMS racing.

Digital Optics

Digital Optics Corporation (DOC) is a worldwide leader in the technology development, design, manufacture and marketing of Photonic Chip™ optical sub-assemblies (OSAs) and Aurora™ illumination solutions. Photonic Chip™ OSAs integrate multiple optical functions (collimating, focusing, splitting, reflecting, filtering, etc.) through our hybrid Z-Stacked wafer/die level integration platform. Additionally, Photonic Chip™ OSAs can include lasers and detectors bonded to the Z-Stack at the die level. DOC's optical solutions are used in a breadth of applications, some of which include: semiconductor fabrication equipment, printers, sensors, data communication and telecommunication transceivers, bar code scanners and medical instruments.

The Polymers Center of Excellence

The Polymers Center of Excellence is a not-for-profit organization located at University Research Park in Charlotte, North Carolina. The full-time staff of 8, plus 5 part-time staff and student assistants from UNC-Charlotte, are backed by an extensive network of industry lecturers, consultants, and faculty members from North Carolina institutions of higher learning. Modern, well-equipped molding, extrusion, and test laboratories, made possible by the generous support of the industry, are available to serve client companies as well as provide a hands-on dimension to PCE's training and workforce development activities.

Companion Program

The Companion Program will include an "Art About Town" tour in Uptown Charlotte and a day-trip to Seagrove Potteries.

"Art About Town"

Travel through a city filled with art. Be amazed by the beauty of some of our most breathtaking gardens...in addition, take a superb look at some of the "brightest jewels" in Charlotte's cultural crown. Tour highlights may include: Mint Museum of Art and of Craft & Design; the Performing Arts Center, and Spirit Square.

Seagrove Potteries

Nestled in the heart of beautiful, rural North Carolina is an area, that since the early 1700's, has been the home of some of the world's most talented and well-known potters. With nearly a hundred potteries in a twenty-five mile radius, Seagrove is becoming known as the pottery capitol of the world. The artisans of Seagrove have been producing usable treasures for almost 300 years, and these wares will be passed down from generation to generation for years to come. So come to Seagrove and see a pottery tradition that has lasted through the ages!

Registration Fees

All fees are in U.S. dollars and payable to UNC Charlotte. We accept VISA, MasterCard, checks, money orders, and purchase orders. Please complete one registration form per person. Companion Program participants should complete their own registration form. Make additional copies of the form as needed.

All fees except the companion registration include entrance to all technical sessions, all conference materials, publications, meal functions, laboratory tours and industry tours. Included in the companion registration fees are conference breakfasts, banquet and two receptions; and companion program tour (see Companion Program for details). There are no single-day registration fees. There are no reduced registration fees for authors or session chairs.

Cancellation and Refunds

Refunds, less an administrative fee of US \$100, will be issued for all cancellations received in writing with before May 14, 2004. No refunds will be made after that date, but a substitution of attendees may be made by notifying the Conferencing Center prior to the conference. Please allow six to eight weeks to receive check refunds. Credit card refunds will be issued to the credit card that had made payment. Should this event cancel in entirety, the University's liability is limited to a refund of the registration fees paid.

Lodging

Hilton Charlotte University Place

8629 JM Keynes Drive

Charlotte, NC 28262

Toll Free: 1-800-HILTONS (445-8667)

Tel: (704) 547-7444

Fax: (704) 548-1081

Online Registration: www.hilton.com; *also available on the conference web page.*

A block of rooms is reserved at the Hilton Hotel, located just 3 miles from campus. Reservations must be made before **May 2, 2004** to guarantee the conference rate of \$89 USD single/double. Be sure to mention "NAMRI/SME" when making your reservation.

Marriott Residence Inn Charlotte University Research Park

8503 North Tryon Street

Charlotte, NC 28262 USA

Phone: (704) 547-1122

Fax: (704) 549-0254

Online Registration: www.marriott.com; *also available on the conference web page.*

A block of rooms has also been reserved at the Marriott's Residence Inn, adjacent to the Hilton Hotel. Reservations must be made before **May 10, 2004** to guarantee the conference rate of \$55 USD Single and \$85 USD for 2-Bedroom Suite. Be sure to mention "NAMRI/SME" when making your reservation. The Group Code for reservation is **NAMNAMA**.

A shuttle service will be provided on June 2nd and 3rd from both hotels to the UNC Charlotte Campus and to the Laboratory Tours.

Travel Information

Charlotte is a dynamic city that combines world-class amenities with warm Southern hospitality. Exciting restaurants, arts and cultural attractions, professional sports, excellent shopping and a variety of accommodations make your Charlotte visit an exciting experience. The second largest financial center in the United States, Charlotte is the largest city between Atlanta and D.C. Add our tree-lined Center City streets, beautiful lakes, parks and nature preserves, and you'll understand why Charlotte is the number one destination in the Carolinas, with 9.4 million visitors each year.

Located at the crossroads of I-77 and I-85, and just one hour from I-40, drivers have convenient access from all parts of the United States. Charlotte-Douglas International Airport carries more than 560 flights a day. Charlotte is also served daily by Amtrak rail service.

All international participants are responsible for their own visa and health insurance needs.

Climate

The average temperature in the summer is 76 degrees Fahrenheit. The average dew point is 63%.

How to Register

Online:

<http://www.mees.uncc.edu/NAMRC32/index.htm>

Mail:

Complete the registration form at the back of this brochure and mail it with your payment using check, money order, or charge card number to:

Lyndee Champion
NAMRC 32 Conference
UNC Charlotte
9201 University City Blvd.
Charlotte, North Carolina 28223-0001 USA

Fax:

Complete the registration form at the back of this brochure and fax it to (704) 687-3158 ATTN: Lyndee Champion, NAMRC 32 Conference. You may fax your registration and submit payment by mail.

For More Information

Visit the NAMRC 32 Web site: <http://www.mees.uncc.edu/NAMRC32/index.htm>

Call or Email Lyndee Champion, Conference Coordinator

Telephone (EST): 704/ 687-4452

Email: Ichampio@uncc.edu



NAMRC 32 Technical Sessions and Programs

Tuesday, June 1, 2004

Hilton Hotel

8:30 a.m. - 5:30 p.m.

NAMRI/SME Board Meeting

5:30 p.m. - 8 p.m.

Conference Registration and Welcoming Reception

Wednesday, June 2, 2004

UNC Charlotte Campus

7:30 a.m. - 8:30 a.m.

Registration and Breakfast

ConeCenter

8:30 a.m. - 10 a.m.

Welcoming Ceremony

Cone Center, McKnight Auditorium

Keynote Address

Cone Center, McKnight Auditorium

Dr. Jimmy Williams, Director of Development, Alcoa Technical Center

10:30 a.m. - Noon

Concurrent Technical Sessions

Dynamics of End Milling

Room 1

Session Chairs: Phillip Jacobs, BWXT Y-12 and Mathew A. Davies, UNC Charlotte

Enhanced Damping in Long Slender Endmills

J.C. Ziegert, R. Sterling, C. Stanislaus, T.L. Schmitz

The Effects of End Mill Alignment Errors on Vibrations at High Spindle Speeds

S.G. Kapoor, M.B. Jun, R.E. DeVor

A Method for Predicting Chatter Stability for Systems with Speed-Dependent Spindle Dynamics

T. Schmitz, J. Ziegert, S. Vijay

Nano-scale Manufacturing

Room 2

Session Chairs: Angela Davies, UNC Charlotte and John Ziegert, University of Florida

Surface Micro/Nanostructuring of Cutting Tool Materials By Femtosecond Laser

S. Lei, K. Kulkani, Z. Chang

Near-Field Enhanced Massively Parallel Nanoscale Modification of Solids

S. Chen, S. Theppakuttai, Y. Lu

Nanometer Scale Ductile Mode Cutting of Soda-Lime Glass

S.Y. Liang, K. Liu, X. Li, X.D. Liu

Feature-Based Process Planning

Room 3

Session Chairs: Yuan-Shin Lee, North Carolina State University and Mike Hardin, Lucent

Manufacturing Feature Mapping and Precedence Relation Generation for Automated Feature-Based Process Planning

D.N. Sormaz, J. Arumugam

Generic Machining Sequence Generation Using Enriched Machining Features

L. Wang, N. Cai, H-Y. (Steve) Feng

Clean-Up Tool Path Generation for Machining Complex Polyhedral Models

Y-S. Lee. Y. Ren

Processing Composite Materials

Room 4

Session Chairs: Amy Helvey, Boeing and Chris Brown, Worcester Polytechnic Institute

A Dynamic Modeling Technique for Damage Progression in Drilling of Composite Laminates

S.P. Owusu-Ofori, P.Y. Andoh

Cryogenically Treated Carbide Tool Performance in Drilling Thermoplastic Composites

D. Kim, M. Ramulu

Advanced Design and Development of Profiled Edge Lamination Tools

D.F. Walczyk, S. Yoo

Noon - 2 p.m.

Lucas Room

NAMRI/SME Awards Luncheon and Founders Lecture

2 p.m. - 4 p.m.

Concurrent Technical Sessions

Machining Models

Room 1

Session Chairs: John Snyder, TechSolve and Placid Ferreira, University of Illinois

A New Methodology for Modeling Material Constitutive Behavior Using An Orthogonal Machining Test

N. Fang, Q. Wu

Mechanistic Modeling of Ball End Milling Including Tool Wear

S.C. Veldhuis, L. Ning

Finite Element Modeling of Machining of 1020 Steel Including the Effects of Round Cutting Edge

Y. Shin, Y. Tian

Metrology Algorithms

Room 2

Session Chairs: Michael Facello, Raindrop Geomagic, Inc. and Rob Edgeworth, Intel

Bounding Box Techniques to Initialize Optimization of Primitive Geometry Fitting

A.H. Chen, T.R. Kurfess

Roundness Evaluation Based On Profile Confidence Level

H-Y. Feng, Q. Jiang, D. OuYang, M.T. Desta

A Factor Analysis Approach for Robust Inspection of Circular Features with Lobing Errors

S. Anand, S. Srinivasan, S.B. Acharya

Tool Path Planning

Room 3

Session Chairs: Martin Hardwick, Step Tools and Venkatarama Srinath Dronavadhya, PTA

A Generic and Practical Algorithm of Iso-Cusped Tool Path Planning for Three-Axis Sculptured Part CNC Machining

Z.C. Chen, D. Song

Tool Wear Compensation and Path Generation in Micro and Macro EDM

K.P. Rajurkar, J. Narasimhan, Z. Yu

Tool Path Generation for Finish Machining of Freeform Surfaces in the Cybercut Process Planning Pipeline

P.K. Wright, D.A. Dornfeld, V. Sundararajan, D. Mishra

Non-traditional Processes

Room 4

Session Chairs: Ralph Resnick, Extrude Hone Corporation and Shuting Lei, Kansas State University

Pulsed Water Jet Machining of Brittle Materials

M.J. Jackson

Internal Finishing of Austenitic Stainless Steel Tube By A Magnetic Field Assisted Finishing Process Using A Slurry Circulation System

H. Ymaguchi, T. Shinmura, R. Kashiwagi

Development of New Burring Process for Thick Plates

K. Dohda, K. Hirasawa, Z. Wang, N. Yokoyama, Y. Kobayashi

COMEC Session on Trends in Undergraduate Manufacturing Engineering

Room 5

Session chair: Hugh Jack, Grand Valley State University

4 p.m. - 6 p.m.

Concurrent Technical Sessions

Monitoring of Manufacturing Processes

Room 1

Session Chairs: Richard Kegg, TechSolve and James F. Cuttino, UNC Charlotte

An Investigation of the Sources of Acoustic Emission in the AFM Process Using A New Technique

R.E. Williams

Hidden Semi-Markov Models for Machinery Health Diagnosis and Prognosis

D. He, M. Dong

Morning

<p>Tuesday June 1, 2004 Hilton Hotel</p>		<p>NAMRI/SME Board Meeting 8:30 am - 5:30 pm</p>		
<p>Wednesday June 2, 2004 UNC Charlotte Campus</p>	<p>Registration and Breakfast 7:30 - 8:30 a.m.</p>	<p>Welcoming Ceremony 8:30 - 10 a.m.</p>	<p>Concurrent Sessions 10:30 a.m. - Noon</p>	<p>Award Luncheon and Founders Lecture Noon - 2 p.m.</p>
<p>Thursday June 3, 2004 UNC Charlotte Campus</p>	<p>Registration and Breakfast 7:30 - 8:30 a.m.</p>	<p>Concurrent Sessions 8:30 - 10 a.m. 10:30 a.m. - Noon</p>		<p>Lunch Noon - 1:30 p.m.</p>
<p>Friday June 4, 2004 Hilton Hotel</p>	<p>Registration and Breakfast 7:30 - 8:30 a.m.</p>	<p>Concurrent Sessions 8:30 - 10 a.m. 10:30 a.m. - Noon</p>		<p>Lunch Noon - 1 p.m.</p>

Afternoon

Evening

<p>Registration and Welcoming Reception</p> <p>5:30 - 8:00 p.m.</p>	
<p>Concurrent Sessions</p> <p>COMEC Session</p> <p>2 - 4 p.m.</p>	<p>Concurrent Sessions</p> <p>Laboratory Tours</p> <p>COMEC Meeting</p> <p>4 - 6 p.m.</p>
<p>Concurrent Sessions</p> <p>1:30 - 3:30 p.m.</p>	<p>NAMRC Banquet</p> <p>Oehler's BBQ</p> <p>7 - 10 p.m.</p>
<p>Concurrent Sessions</p> <p>1:30 - 3:30 p.m.</p>	<p>NAMRI/SME and ASME/MED Membership Meetings</p> <p>Laboratory Tours</p> <p>4 - 6 p.m.</p>
<p>SME/Greenfield Coalition Learning Resources Workshop</p> <p>Noon - 4:45 p.m. (and 8:30 a.m. - Noon Saturday)</p>	

Manufacturing Processes Knowledge - Evaluation of Deficiencies and Corrective Actions

Z. Prusak

Geometric Modelling for Design and Manufacturing

Room 2

Session Chairs: Osborne Martin, Caterpillar and Tommy Tucker, Tucker Innovations, Inc.

A Frame Work for Dual Product Representation of Free Form Surfaces for CAD/CAM Applications

M. Gadalla

A Real Time Scheme of Intelligent NURBS Interpolation for CNC Systems to Machine Sculptured Surfaces

X. Liu, F. Ahmad, K. Yamazaki, X. Zhang, M. Mori

Physically Accurate Haptic Rendering and Virtual Assembly

J. Xiao, Q. Luo

Materials Testing

Room 3

Session Chairs: Adam Schaut, Alcoa and Bala Muralikrishnan, National Institute of Standards and Technology

Cutting Characteristics of Preform and SMC Composites

D. Kim, M. Ramulu, S-Y. Kuo, Y-M. Chen, R. Spitsen

Determination of Cruciform Specimen for Stress Based Failure Criterion Evaluation

B.L. Kinsey, S. Moondra

The Evaluation of Specific Energy in Chip Formation Using the Principle of A Charpy Test Machine

R.T. Coelho, A.R. Rodrigues

COMEC Meeting

Room 4, 4 p.m. - 6 p.m.

Laboratory Tours

4 p.m. - 6 p.m.

NAMRC Banquet

Oehler's BBQ

7 p.m. - 10 p.m.

Thursday, June 3, 2004
UNC Charlotte Campus

7:30 a.m. - 8:30 a.m.

Registration and Breakfast

8:30 a.m. - 10 a.m.

Concurrent Technical Sessions

Drilling Processes

Room 1

Session Chairs: Kori Ehmann, Northwestern University and Jimmie Miller, UNC Charlotte

Tool/Work Material/Cutting Fluid Interaction While Tapping Into AA-319 and AA-A356 T6 Lost Foam Aluminum Castings

A.K. Srivastava, M.A. Kinney

Hole Quality in Drilling of Annealed INCONEL 718

M.A. Mannan, S.E. Alsagoff

A Study of Drilling of Varying Reinforcement SiCp/Al with Solid Carbide and Carbide Tipped Drills

W.E. Pedersen, M. Ramulu

Life Cycle Analysis

Room 2

Session Chairs: Raja Chandrashekar, I2 and Placid Ferreira, University of Illinois

Effect of Product End-of-Life Options and Disassembly Level on Cost and Environmental Impact

I. Fidan, S. Tumkor, M. Der

Optimizing the Functional Design and Life Cycle Cost of Mechanical Systems Using Genetic Algorithms

S. Smith, Z. Shen

A Model for Material Flows and Economic Exchanges Within the U.S. Automotive Life Cycle Chain

J.W. Sutherland, A.P. Bandivadekar, K.L. Gunter, V. Kumar

Virtual Machining

Room 3

Session Chairs: Keith Young, Boeing and Jing Xiao, UNC Charlotte

Simulation-Based Manufacturing Error Synthesis: Input Analysis and Validation

S. Huang, R. Musa

A Collision Detection Method for Virtual Manufacturing

W. Chou, J. Xiao

A Virtual Machine Tool (VMT) Integrated Design Environment and Its Application to Meso-Scale Machine Tool Development

R. Mayor, H. Chen, J. Ni

Testing Methods in Manufacturing

Room 4

Session Chairs: Steven Liang, Georgia Tech and Son Bui, National Institute of Standards and Technology

A Quantitative Parameter for Non-Destructive Evaluation of Drilled Laminated Composite Parts

S.P. Owusu-Ofori, P.Y. Andoh

Measurement Uncertainty in Tribological Wear Rate Testing

T. Schmitz, J. Action, D. Burris, W. Sawyer, J. Ziegert

Fourier Analysis of X-ray Microdiffraction Profiles to Characterize Laser Shock Peened Metals

Y.L. Yao, H. Chen, J. Kysar, I. C. Noyan, Y. Wang

10:30 a.m. - Noon

Concurrent Technical Sessions

Material Behavior in Hard Turning

Room 1

Session Chairs: Changsheng Guo, United Technologies Research Center and Yong Huang, Clemson University

White Layer Formation in Hardened Steel Turned With A Rotary Tool

S. Melkote, S. Subbiah

Microstructural Characterization of White Layers Formed During Hard Turning and Grinding

Y.B. Guo, G.M. Janowski

Finite Element Modeling of Chip Formation in Hard Turning Using MARCHMENTAT

R. Pavel, I.D. Marinescu

Metrology Processes

Room 2

Session Chairs: Ken Sheehan, Entelegence and Paulo Pereira, Caterpillar

An Experimental Study on the Vibration-Free High-Speed Operation of A Three Dimensional Coordinate Measuring Machine

P. Sriyotha, K. Yamazaki, X. Zhang, M. Mori

Vision Inspection of Micro-Drilling Processes on the Machine Tool

S-C. Chung, H-S. Yoon

Development of An In-Situ Machine Tool Axis Positioning Accuracy Measurement Device

M.A. Mannan, R. Ramesh, A.N. Poo

Downstream Effects

Room 3

Session Chairs: Tom Dello, MLI and Gregory W. Caskey, UNC Charlotte

Influence of the Composition of WC-Based Cermets on the Manufacturability by Wire-EDM

B. Lauwers, W. Liu, W. Eraerts

Environmentally Conscious Machining of a Cast Aluminum Alloy: Investigation of Cutting Fluid Effects in Drilling

A.K. Balaji, A.D. Jayal, R. Sesek, A. Gaul, D. Lillquist

Modeling of Non-traditional Processes

Room 4

Session Chairs: Bob Winfough, Bourn & Koch and Rajesh Sethupathi, Caterpillar

Finite Element Simulation of Compaction of Ceramic Powder in Making Meso-Scale Heat Exchangers

P. Kwon, C.K. Kok

Design of an Experimental Test Bed for Depositing Membrane Material for High Temperature Fuel Cells

T.A.L. Harris, D. Walczyk, R. Puffer, R. O'Donnell

Analysis and Prediction of Size Effect on Laser Forming of Sheet Metal

Y.L. Yao, P. Cheng, C. Liu, D. Pratt, Y. Fan

Noon - 1:30 p.m.

Lunch in SAC Salon

1:30 p.m. - 3:30 p.m.

Concurrent Technical Sessions

Modeling of Cutting Forces

Room 1

Session Chairs: John Sutherland, Michigan Technological University and Brian Mann, University of Florida

A Simplified Model for Ploughing Forces in Turning

D.J. Waldorf

Peak Force Prediction Accuracy of A Rigid-Tool Discrete Mechanistic Force Model

B.K. Fussell, D.P. Doherty, R.B. Jerard

A Study on Cutting Force in the Milling Process of Glass

T. Matsumura, T. Hiramatsu, T. Shirakashi, T. Muramatsu

Wafer Processing

Room 3

Session Chairs: Tom Kurfess, Georgia Institute of Technology and Trichy Pasupathy, University of Florida

Optical Transmission Properties of Silicon Wafers: Experimental Study

J.M. Zhang, J.G. Sun, Z.J. Pei

Fine Grinding of Silicon Wafer: Benefits and Technical Barriers

Z.J. Pei, G.R. Fisher, A. Strasbaugh

Tooling Design and Analysis

Room 4

Session Chairs: Sinan Badrawy, Moore Tool and Yiduo Zhang, HTI

Integrated Design Methodology For High-Precision/Speed Servomechanisms

S-C. Chung, M-S. Kim

Incremental Double Diaphragm Forming of Composite Materials Using Reconfigurable Tooling

C.B. Munro, D. Walczyk, G. Dvorak, S. Slusarski

A Methodology to Measure Joint Stiffness Parameters for Toolholder/Spindle Interfaces

J.S. Agapiou

4 p.m. - 6 p.m.

NAMRI/SME and ASME/MED Membership Meetings, UNC Charlotte Campus, Cone Center

Laboratory Tours

6:30 p.m. - 10 p.m.

Reception at Hilton Hotel

Friday, June 4, 2004

Hilton Hotel

7:30 a.m. - 8:30 a.m.

Registration and Breakfast

8:30 a.m. - 10 a.m.

Concurrent Technical Sessions

Machining of Hard Materials

Room 1

Session Chairs: Jerry Halley, Tech Manufacturing and Tony Schmitz, University of Florida

Effect of Cutting Conditions on Tool Performance in CBN Hard Turning

S.Y. Liang, Y. Huang

Ductile Regime Machining of Silicon Nitride: A Numerical Study Using Drucker-Prager Material Model

S.K. Ajjarapu, R.R. Fesperman, J.A. Patten, H.P. Cherukuri, C. Brand

Performance of CBN Cutting Tools in Facing of Age Hardened INCONEL 718

M.A. Mannan, R.M. Arunachalam

Tolerance Analysis

Room 3

Session Chairs: Sunil Bapat, EDS and Ed Morse, UNC Charlotte

Simulation-Based Tolerance Stackup Analysis in Machining

S. Huang, R. Musa

Unified Modeling of Variation Propagation and Tolerance Synthesis for Integrated Machining-Assembly Systems, Part I: Modeling Variation Propagation

W. Zhong

Unified Modeling of Variation Propagation and Tolerance Synthesis for Integrated Machining-Assembly Systems, Part II: System Level Tolerance Synthesis

W. Zhong

Modelling of Forming Operations

Room 4

Session Chairs: Klaus Weinmann, University of California and George Orji, National Institute of Standards and Technology

Identification of Impacting Factors of Surface Defects in Hot Rolling Processes Using Multi-Level Regression Analysis

S. Zhou, N. Jin, T-S. Chang

A Precision On-Line Model for the Prediction of Deformation Energy and Frictional Energy in Hot Strip Rolling

S.M. Hwang, J.H. Lee, J.W. Choi, W.J. Kwak

Determination of Appropriate Temperature Distribution for Warm Forming of Aluminum Alloys

M. Koc, H.S. Kim, J. Ni

10:30 a.m. - Noon

Concurrent Technical Sessions

Operations Planning

Room 1

Session Chairs: Anil Srivastava, TechSolve and Osborne Martin, Caterpillar

Strategic Optimization of Cutting Conditions by Model-Based Analysis with the Aid of Database Utilization

H. Sasahara, M. Tsutsumi

A Systematic Classification of the Geometry of Tool-Work Engagement in Machining With Flat-Faced Tools

V. Madhavan, A.H. Adibi-Sedeh

Analytical Determination of Initial Weld Line Position for Tailor Welded Blank Forming

B.L. Kinsey, M.N. Bravar

Integrating Design and Metrology

Room 3

Session Chairs: Jim Salsbury Mitutoyo and Babu Uppliappan, Caterpillar

A Preliminary Investigation on Metrology Aspects in Rapid Prototyping

Y.K. Chou, S.C. Nama, J.M. Simmons

Design Centering Under Conventional and Sequential Tolerance Controls

S. Anand, Y. Kovvur, C.K. McCord

Finite Element Modeling of Forming

Room 4

Session Chairs: Harish P. Cherukuri, UNC Charlotte and John Ziegert, University of Florida

Simplified Three-Dimensional Finite Element Simulation of Shear Spinning Process Based on Axisymmetric Modeling

K. Mori, T. Nonaka

A Design Method of Loading Paths for Tube Hydroforming Using FEM Simulator

A. Shirayori, S. Fuchizawa, M. Narazaki

Multiscale-Based Optimization of Superplastic Forming

M.K. Khraisheh, N. Thuramalla

Noon - 1:00 p.m.

Lunch

Case-Study Based and IT-Enabled Learning Resources for Education in Manufacturing Workshop at NAMRC June 4-5, 2004

Sponsored by the Society of Manufacturing Engineers and the Greenfield Coalition

This is the first focused workshop that addresses the creation and use of real-world manufacturing case studies in higher education. It is being held in conjunction with the 32nd NAMRC at the University of North Carolina at Charlotte. The workshop will demonstrate how current manufacturing engineering research can be leveraged back into the classroom using web-based, information technology (IT)-enabled learning resources and modern approaches to adult education. Participants of the workshop will represent a new community of educators interested in sharing IT-enhanced learning materials created expressly for manufacturing engineering education.

A key impetus for this event was a recently published National Academy of Engineering report which concluded that many opportunities for improving science, technology, engineering, and mathematics education with IT have fallen short because too often such materials represented islands of innovation rather than broad-based improvement.

The Greenfield workshop addresses this challenge by:

- Discussing best practices in the use of case studies and collaborative learning in today's classrooms
- Conducting a workshop on using web-based information technologies to get real-world manufacturing data into courseware, and
- Demonstrating Greenfield Coalition and other IT-enhanced learning materials.

For example, one demonstration will show how Engineering Research Center data on pressed metal was subsequently incorporated into a Greenfield undergraduate engineering course on "Forming Technology" (Tylan Altan, Ohio State University).

The workshop begins Friday, June 4 with a luncheon and concludes by Noon on Saturday, June 5.

The Greenfield Coalition, part of the community of NSF-sponsored Engineering Education Coalitions and focused entirely on manufacturing engineering, has developed a suite of sharable learning resources which embed (1) modern approaches to adult learning, (2) active and cooperative experiences, and (3) real-world manufacturing examples. For information on the Greenfield Coalition (www.greenfield-coalition.org/) contact Don Falkenberg at falken@focushope.edu or (313) 494-4548.

Agenda

Thursday Evening

Participation with NAMRC evening social function for anyone who arrives early

Friday Morning

NAMRC sessions

Friday Afternoon

Noon - 2:00	LUNCHEON and Keynote address
2:30 - 3:00	Demonstration 1: "Forming Technology" by Taylan Altan, Ohio State University
3:00 - 3:15	BREAK
3:15 - 3:45	Demonstration 2: "Operations Management" by Chinnam, Wayne State University
3:45 - 4:15	Demonstration 3: Integrated Business and Engineering Case studies by P.K. Raju, Auburn University
4:15 - 4:45	Demonstration 4: Manufacturing Case Studies by William White, Lawrence Technological University

[Participants are on their own for DINNER]

Saturday Morning

8:30a - 10:00	Workshop: "How To Design Engineering Case Studies" by Don Falkenburg and Diane Schuch Miller, Wayne State University
10:00 - 10:15	BREAK
10:15 - 10:45	Demonstration 5: "A Thermally Instrumented Grinder - Connecting Theory with Practice" by Mark Schumak, University of Detroit Mercy
10:45 - 11:15	Demonstration 6: "Manufacturing Systems" by Emory Zimmers, Lehigh University
11:15 - 11:45	Demonstration 7: "Facilities Design" by Leslie Monplaisir, Wayne State University
11:45 - 12:00	Creating a Community of Educators to Share IT-Enhanced Teaching Materials by Don Falkenburg and Mark Stratton

NAMRC 32 CONFERENCE REGISTRATION FORM

June 1 - 4, 2004 Charlotte, NC, USA

Complete a form for each individual attending (including *Guest Program Registrants*)

First Name: _____ Last Name: _____

SME Membership #: _____ I am not an SME Member

Name (First and Last) Preference for Name Tag: _____

Title: _____

Company/Organization Affiliation: _____

Street Address: _____

Address (cont.): _____

City: _____ State/Province: _____

ZIP/Postal Code: _____ Country: _____

Daytime Phone Number: _____ Fax: _____

E-mail Address: _____

REGISTRATION FEES (ALL FEES ARE IN US DOLLARS)

- | | |
|--|-------|
| <input type="checkbox"/> Full Conference Registration (Early) before April 2, 2004 at 5 p.m. EST | \$400 |
| <input type="checkbox"/> Full Conference Registration after April 2, 2004 | \$500 |
| <input type="checkbox"/> Student Conference Registration (Early) before April 2, 2004 at 5 p.m. EST | \$200 |
| <input type="checkbox"/> Student Conference Registration after April 2, 2004 | \$250 |
| <input type="checkbox"/> SME/Greenfield Coalition Learning Resources Workshop..... | \$25 |
| <input type="checkbox"/> Guest Program Registration | \$150 |

TOTAL: _____

There will be a \$100 administration fee for cancellations made prior to May 9, 2003. There will be no refunds after May 9, however your registration may be transferred to another delegate.

PAYMENT

- Credit Card Visa Mastercard

Card Number: _____ Expiration Date: _____

Name on Card: _____ Signature: _____

- Check or Money Order. Payable to: **UNC Charlotte Continuing Education**

Purchase Order Number _____

Send the Invoice to the Attention of _____

Phone number for follow-up _____

Billing Address _____

OTHER INFORMATION

- Yes, I am presenting a paper or other lecture at the NAMRC

- Yes, I have special needs (dietary or disability)

Please specify: _____

- Yes, I will attend the Luncheon on **Friday, June 4th.**

Future NAMRC Hosts

NAMRC 33

May 24-27, 2005
Columbia University,
New York, NY

Conference Co-Chairs, Y. Lawrence Yao and
Richard W. Longman

Are you interested in hosting a future NAMRC?

Since 1973, NAMRC has been held on the campus of a host institution to encourage a dialogue between conference attendees, offer opportunities for laboratory tours, disseminate state-of-the-art manufacturing knowledge, etc. Institutions wishing to host a NAMRC are encouraged to submit a proposal.

The NAMRI/SME Board of Directors reviews proposals annually. NAMRC site selections are usually made two to three years ahead to allow for adequate planning and promotion of the conference. Operating procedures that detail the responsibilities of the host institution and the Society of Manufacturing Engineers are available. Submission of a written proposal and formal presentation of the proposal (including a question and answer session) at a Board of Directors meeting is required. If the proposal is selected, the host institution will enter into a conference agreement with SME. The Board of Directors requires conference-planning updates at its semi-annual meetings. Information on how to submit a proposal is online at www.sme.org/namri.

The deadline for receipt of proposals is April 15. This date allows for proposal review by the NAMRI/SME Board of Directors prior to their meeting at NAMRC. One original and twelve (12) copies should be submitted to:

Mark Stratton
NAMRI/SME Manager
Society of Manufacturing Engineers
One SME Drive
P.O. Box 930
Dearborn, MI 48121-0930
Phone: (313) 425-3307
Email: techcommunities@sme.org

SME's Education and Research Community

To better meet the needs of manufacturing professionals, companies, and industries, SME's Board of Directors recently approved the launch of a new Technical Community Network, consisting of seven technical communities that represent key areas within the manufacturing enterprise.

While folding in the members of SME's existing technical associations, each community is now forming a number of member technical work groups that focus on niche processes or applications. Hundreds of members are already participating on these technical groups, which are self-forming, fluid, and easy to engage in through web board discussions, tele-conferencing calls and other modern meeting tools.

Education is one of those newly emerging communities, offering benefits, technical information, and involvement opportunities for those members involved in manufacturing education and research.

The Education and Research Community is a member driven unit of SME that motivates, enables and engages its members in identifying education and training needs in manufacturing. The Community provides SME student and faculty members with publishing opportunities and professional recognition and all of its members with professional development and networking opportunities.

If you are interested in participating on a technical workgroup (you may even want to form a new group!), contact Mark Stratton at techcommunities@sme.org and get involved today.

For more information on the Education Community, visit www.sme.org/edu.