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North American Manufacturing  
Research Institution of SME announces...



College of Engineering  
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# ELEVENTH NORTH AMERICAN MANUFACTURING RESEARCH CONFERENCE and ANNUAL MEETING MAY 24-26, 1983

North American Manufacturing Research Institution of SME  
One SME Drive • P.O. Box 930  
Dearborn, Michigan 48121 U.S.A.

May 24-26, 1983

## NAMRC-XI

College of Engineering  
University of Wisconsin—Madison  
Madison, Wisconsin

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## GENERAL AND REGISTRATION INFORMATION

### REGISTRATION

Advance registration is important to the organization of the conference, as adequate facilities and meeting space may be arranged only when the size of the group is known in advance. Please complete the attached advance registration form and return it to us by May 9, 1983. All registrations will be acknowledged and further information will be sent including campus maps, parking permits, travel information, etc.

Final registration will be held Monday, May 23rd, 7-10 P.M. at Howard Johnson's Downtown Motor Lodge and Tuesday, May 24th, 8-10:30 A.M. at Union South, corner of Randall and Johnson Streets, in the Dag Hammarskjold Room (Room 109).

### FEE

The registration fee of \$200.00 U.S. per person includes two lunches, the Tuesday banquet, the Thursday brunch, refreshment breaks and a bound copy of the NAMRC-XI Proceedings. There will be no one-day registration fees.

The registration fee must be paid by cash or check. The check should be payable to the University of Wisconsin. A refund will be made if notification of cancellation is received two weeks prior to the start of the conference. Substitutions will be accepted anytime.

### LOCATION

The program sessions will be held at the Union South adjacent to the Engineering Campus of the University of Wisconsin—Madison, Madison, Wisconsin, USA.

Madison can be reached:

By car: Madison is 90 miles west of Milwaukee and 125 miles northwest of Chicago and is accessible from Interstates 90 and 94.

By air: The Dane County Regional (Madison, WI) airport is served by Republic, Northwest, Ozark, Frontier, and Mississippi Valley Airlines. Airport limousines and taxis serve the University of Wisconsin—Madison campus and nearby hotels and motels including those at which rooms have been booked.

### VISIT TO LABORATORIES

The manufacturing laboratories of the College of Engineering will be open for visits at times which will be posted in the conference lobby and shown in this brochure.

### LODGING

Blocks of rooms for the conference have been reserved at the following:

- Howard Johnson's Downtown Motor Lodge  
525 West Johnson Street  
Madison, WI 53703  
(608) 251-5511

Special U.W.—Madison rates of \$35 + 12% tax for single rooms or \$42 + 12% tax for double rooms. Block reservations will be held until May 2, 1983.

- The Madison Inn  
601 Langdon Street  
Madison, WI 53703  
(608) 257-4391

Requests rates when writing or calling; rates vary from \$35 to \$46 + 12% tax for singles and from \$46 to \$52 + 12% tax for doubles. Block reservations will be held until May 2, 1983.

BE SURE TO STATE THAT YOU ARE ATTENDING THE NAMRC-XI CONFERENCE AT THE UNIVERSITY OF WISCONSIN WHEN MAKING YOUR RESERVATION

\*\*\*PLEASE MAKE YOUR OWN RESERVATIONS\*\*\*

### SHUTTLE BUS SERVICE

Transportation will be arranged to bring participants to the Union South if desired. Union South is .7 miles from Howard Johnson's and 1 mile from the Madison Inn. Pick up points will be at the two motels for going and on the north side (Johnson Street) of Union South for returning.

- 8:15 a.m. Tuesday, May 24
- 9:00 p.m. Tuesday, May 24 after the dinner
- 8:00 a.m. Wednesday, May 25
- 4:30 p.m. Wednesday, May 25
- 8:30 a.m. Thursday, May 26
- 11:30 a.m. Thursday, May 26

### PARKING

For those who drive to campus, free parking is available in Lot 17 on the Engineering Campus. A special parking permit will be mailed upon receipt of the advance registration form if so requested.

### SPOUSES PROGRAM

A spouses program is being planned which includes interesting and varied activities. Plan to start your NAMRC activities by joining in the reception (cocktails and hors d'oeuvres) at Howard Johnson's from 7-10 p.m. on Monday evening.

Tuesday, May 24, will begin with coffee and rolls at Howard Johnson's at 8:30 a.m. At 9:30 the group will leave for a driving tour of Frank Lloyd Wright homes in Madison and a guided tour of the Weiss home. A box lunch and slide lecture is planned at the F.L. Wright designed Unitarian Church. At 2:00 p.m. there will be an optional walk through the University of Wisconsin Arboretum. Plan to join your spouses for cocktails at 6:15 and dinner at 7:00 p.m.

Up early on Wednesday, May 25, for an 8:00 a.m. departure by bus (coffee and rolls under way) to Milwaukee for a tour of the famous Pabst Mansion and Watts, a tea-house luncheon and an option of mall shopping or the art

museum. Leaving Milwaukee at 3:00 p.m. to join your spouse and friends for an intimate dining experience (at your own expense) at any one of Madison's many fine restaurants.

Join the conference participants for brunch on Thursday morning at 9:00 a.m. at Union South. The conference ends at 11:30 a.m. The charge will be determined when we know the number of spouses interested. Please indicate your interest on the registration form.

### PROCEEDINGS

All participants in the conference paying the registration fee will receive one bound copy of the NAMRC-XI Proceedings. Those who wish additional copies may order them in advance or at the Conference. After May 26, 1983, copies will be available by mail order through the Society of Manufacturing Engineers, One SME Drive, P.O. Box 930, Dearborn, Michigan 48121, U.S.A. at \$65.00 for NAMRI/SME and SME members and \$65.00 for nonmembers.

### CONFERENCE ORGANIZATION

The North American Manufacturing Research Conferences were created by a group of researchers dedicated to further knowledge, and its dissemination and application in the field of materials processing. Presently the Conference is part of the activities of the North American Manufacturing Research Institution of SME.

The papers presented at this Conference have been selected by the Scientific Committee of NAMRI/SME from a large number of submitted abstracts. Conference arrangements are the responsibility of the NAMRC-XI Organizing Committee, University of Wisconsin—Madison.

### CONFERENCE PROSPECTUS

The Eleventh North American Manufacturing Research Conference (NAMRC-XI) is designed to provide a forum for the presentation and informed critical discussion of results of basic and applied research in metalworking and related manufacturing. The format of the Conference is similar to that of NAMRC-I (McMaster University, 1973), NAMRC-II (University of Wisconsin—Madison, 1974), NAMRC-III (Carnegie—Mellon University, 1975), NAMRC-IV (Battelle Columbus Laboratories and Ohio State University, 1976), NAMRC-V (University of Massachusetts, 1977), NAMRC-VI (University of Florida, 1978), NAMRC-VII (University of Michigan, 1979), NAMRC-VIII (University of Missouri, 1980), NAMRC-IX (The Pennsylvania State University, 1981) and NAMRC-X (McMaster University, 1982).

The papers presented at this conference will describe work in the fields of metal forming, metal cutting, machine tools, and manufacturing systems and controls. All papers presented at the conference are contained in the bound Conference Proceedings and represent work conducted in many of the renowned metalworking research centers throughout the world.



# ELEVENTH NORTH AMERICAN MANUFACTURING RESEARCH CONFERENCE

## MAY 23-26, 1983

### TECHNICAL SESSIONS AND PROGRAM



#### MONDAY, MAY 23

##### 7:00-10:00 p.m. REGISTRATION AND RECEPTION

University "A", Howard Johnson's Downtown Motor Lodge

#### TUESDAY, MAY 24

##### 8:00-10:30 a.m. REGISTRATION

Dag Hammarskjold Room (Room 109), Union South Building

9:00-10:00 a.m.  
Welcoming Address: Prof. J. G. Bollinger, Dean, College of Engineering and President, NAMRI/SME

Opening Address: Dr. M. E. Merchant, Principal Scientist, Manufacturing Research, Cincinnati Milacron Inc., Cincinnati, Ohio

##### 10:00-10:30 a.m. REFRESHMENT BREAK

##### 10:30-noon SESSION 1

- A. Co-Chairmen: T. Altan, Battelle Columbus Labs and S. Kalpakjian, Illinois Institute of Technology
1. "What Stress-Strain Curve Shall I Use?" E. G. Thomsen, University of California, Berkeley.
  2. "Solid-Phase Flow Behavior of Polymers," G. W. Halldin and Y. C. Lo, University of Wisconsin—Madison.
  3. "A Yield-Criterion and a Flow Rule for Sintered Porous Materials," S. D. El Wakil, Bradley University.
- B. Co-Chairmen: M. E. Merchant, Cincinnati Milacron and J. D. Watson, BHP Melbourne Research Laboratories
1. "Fracture on the Shear Plane in Continuous Cutting," W. S. Sampath, and M. C. Shaw, Arizona State University.
  2. "Experimental Verification of a Catastrophe Theory Chip Formation Model," B. E. Klamecki, University of New Mexico.
  3. "A Slip-Line Solution for Two-Dimensional Steady State Machining with a Stagnant Region at the Tip of the Tool," M. Abebe and F.C. Appl, Kansas State University.
- C. Co-Chairmen: L. E. Jenneke, Landis Tool and J. G. Bollinger, University of Wisconsin—Madison
1. "Chatter Suppression in Turning," S. Y. Tsai, K. F. Eman and S. M. Wu, University of Wisconsin—Madison.
  2. "A Chatter-Resistant Cantilever Boring Bar," E. J. Rivin, Wayne State University.
  3. "Use of Special Milling Cutters Against Chatter," J. Tlustý, F. Ismail and W. Zaton, McMaster University, Hamilton, Ontario, Canada.

##### 12:00-1:30 p.m. LUNCHEON Union South

##### 1:30-3:00 p.m. SESSION 2

- A. Co-Chairmen: F. W. Boulger, Battelle Columbus Laboratories, T. Altan, Battelle Columbus Laboratories
1. "Flattening of Workpiece Surface Asperities in Metal Forming," S. Sheu, and W. R. D. Wilson, Northwestern University.
  2. "Determination of Strain Distribution in Metal Forming Processes Using In-Plane Moiré Method," C. J. Chen and F. P. Chiang, State University of New York at Stony Brook.
  3. "Influence of End Condition on Instability of Free Bulging of Tubes," S. B. Sorensen, Avibrás Ltda. and H. A. Al-Qureshi, Instituto Tecnológico de Aeronáutica, São José dos Campos, Brasil.
- B. Co-Chairmen: E. J. Duwell, 3M Company and R. S. Hahn, Hahn Associates
1. "On the Structure of Grinding Wheels in Creep-Feed Grinding," X. H. Zhu, University of Wisconsin—Madison and Z. C. Liu, Huazhong University of Science & Technology, China.
  2. "New Dressing Method for CBN Wheel," M. Daimon and T. Ishikawa, Komatsu Ltd., Osaka, Japan.
  3. "The Significance of the Spark-Out Phase During Plunge Grind Operations," C. H. Shen, General Motors Technical Center.
- C. Co-Chairmen: J. W. Mink, Barber Coleman Company and Dennis Bray, Ingersoll Milling Machine Company
1. "Experimental-Computational Identification of Constructional Weak Elements of Cutting Machine Tools with Respect to Self-Excited Vibrations—State of Art." M. Weck, E. K. Probler and G. Petuelli, Technical University of Aachen, Aachen, West Germany.
  2. "Computerized Three-Dimensional Error Analysis for Automated Part Inspection," J. Schneeberger, J. G. Bollinger and N. A. Duffie, University of Wisconsin—Madison and K. Yamazaki, Toyohashi University of Technology, Toyohashi, Japan.
  3. "A Methodology of Microprocessor Control System Development for Machine Tool Applications," K. Yamazaki and H. Suzuki, Toyohashi University of Technology, Toyohashi, Japan.

##### 3:00-3:30 p.m. REFRESHMENT BREAK

##### 3:00-5:00 p.m. SESSION 3

- A. Co-Chairmen: K. C. Ludema, University of Michigan and S. Kalpakjian, Illinois Institute of Technology
1. "A Note on Evaluation of Interface Friction in Ring Tests," S.

##### 10:30-noon SESSION 5

- A. Co-Chairmen: F. W. Boulger, Battelle Columbus Laboratories and T. Altan, Battelle Columbus Laboratories
1. "Analysis of Spread in Flat-Tool Forging by the Finite Element Method," J. X. Sun, G. J. Li and S. Kobayashi, University of California, Berkeley.
  2. "Analysis of the Triangular Velocity Field by the Computer Graphic Simulation," W. Pachla, Polish Academy of Sciences, Poland and J. Z. Pan, General Research Institute for Non-ferrous Metals, Beijing, China and S. Rosenberry and B. Avitzur, Lehigh University.
  3. "Analysis of Central Burst in Forgings," W. A. Gordon, Lehigh University and C. J. Van Tyne, Lafayette College.
- B. Co-Chairmen: M. Field, Cincinnati, Ohio and David Lee, Ford Motor Company
1. "Effect of Variable Chip Load on Machining Performance in Face Milling," R. E. DeVor, S. G. Kapoor and H. J. Fu, University of Illinois at Urbana—Champaign and P. C. Subbarao, The Ingersoll Milling Machine Company.
  2. "Control of Surface Error in End Milling," R. E. DeVor and J. W. Sutherland, University of Illinois at Urbana—Champaign and W. A. Kline, Kennametal, Inc.
  3. "Experience with the use of ASTM E618-81 for Machinability Testing of Free Cutting Steels," J. D. Watson and R. H. Davies, BHP Melbourne Research Laboratories, Clayton, Victoria, Australia and S. Ramalingam, University of Minnesota.
- C. Co-Chairmen: W. J. Zdeblick, Metcut Research Associates Inc. and T. H. Chang, University of Wisconsin—Milwaukee
1. "Optimum Selection of Machining Conditions for Peripheral Milling with Practical Constraints," D. S. Ermer, University of Wisconsin—Madison and S. N. Araj, Birzeit University, West Bank, Jordan.
  2. "Stochastic Optimization of Production Speed," N. Takahashi, Matsue Tech. College, Matsue, Japan and C. H. Kahng, University of Colorado.
  3. "Analysis of Mathematical Model Building Techniques Adaptable to Machinability Data Base Systems," P. Balakrishnan and M. F. DeVries, University of Wisconsin—Madison.

##### 12:00-1:30 p.m. NAMRI/SME LUNCHEON Union South

##### 1:30-3:00 p.m. SESSION 6

- A. Co-Chairmen: S. Kobayashi, University of California and G. W. Halldin, University of Wisconsin—Madison
1. "Computer Aided Design of Blanks for Deep Drawn Irregular Shaped Components," H. Goeckl and K. Lange, Institut für Umformtechnik, Universität Stuttgart, Stuttgart, West Germany.



2. "Use of CAD/CAM to Manufacture Streamlined Dies for Extrusion of Complex Materials," **R. Kavalauskas, J. S. Gunasekera and H. L. Gegel, Wright-Patterson AFB and S. M. Doraivelu, Universal Energy Systems, Inc.; J. C. Malas and J. T. Morgan, AFWAL Materials Laboratory.**
3. "Wrap up of today's papers"
- B. Co-Chairmen: **W. R. DeVries, Rennselaer Polytechnic Institute and M. F. DeVries, University of Wisconsin—Madison**
1. "EDM Electrode Wear Analysis by Real Time Pulse Detection," **D. F. Dauw, R. Snoeys and W. Dekeyser, Katholieke Universiteit Leuven, Leuven, Belgium.**
2. "Pulse Current Signal as a Sensor for On-Line Computer Control of EDM," **K. P. Rajurkau, S. M. Pandit and W. H. Wittig, Michigan Technological University.**
3. "Wrap up of today's papers"
- C. Co-Chairmen: **W. A. Crawford, CADAM Inc. and N. A. Duffie, University of Wisconsin—Madison**
1. "Development of Computer-Aided Generative Type Process Planning System for Prismatic Parts in Machining," **K. Iwata and N. Sugimura, Kobe University, Kobe, Japan.**
2. "Computer-Aided Milling Operation Planning Program—CAMOPP," **S. A. Pellegrino, General Electric Company and I. Ham, The Pennsylvania State University.**
3. "Wrap up of today's papers"

3:00-3:30 p.m.

### REFRESHMENT BREAK

3:45-4:30 p.m.

### TOURS OF MANUFACTURING LABORATORIES

#### DINNER ON YOUR OWN

8:00 p.m.

1. NAMRI Membership meeting, University "A", Howard Johnson's  
2. ASME/PED Board meeting, Regents room, Howard Johnson's

## THURSDAY, MAY 26

9:00-10:00 a.m.

### BRUNCH

Union South

10:00-11:30 a.m.

### SESSION 7

- A. Co-Chairmen: **S. Ramalingam, University of Minnesota and B. F. von Turkovich, University of Vermont**
1. "A New Method to Measure Normal Pressure and Frictional Stresses in the Roll Gap During Cold Rolling," **K. A. Stelson, University of Minnesota.**
2. "A Simplified Approach to Calculate Springback in Brake Bending," **P. S. Raghupathi, Battelle Columbus Laboratories; M. Karima, Atomic Energy of Canada Ltd.; N. Akgerman and T. Altan, Battelle Columbus Laboratories.**
3. "Evaluation of Sheet Steel Surfaces Produced by Various Finishing Processes Using CEST," **A. N. Shuaib, University of Petroleum & Minerals, Dhahran, Saudi Arabia and S. M. Wu, University of Wisconsin—Madison.**
- B. Co-Chairmen: **W. B. Rice, Queens University and D. S. Ermer, University of Wisconsin—Madison**
1. "Chip Form Detection Using Acoustic Emission," **D. A. Dornfeld and M.S. Lan, University of California, Berkeley.**
2. "Application of Infrared Radiation Measurements in Grinding Studies," **L. Kops, McGill University and M. C. Shaw, Arizona State University.**

11:30 a.m.

### CONFERENCE ENDS

1. "Friction and Wear in Machining and Forming Processes," **Berkeley.**
2. "Friction Reduction in Machining and Forming Processes," **P. K. Wright and R. S. Rao, Carnegie—Mellon University.**
3. "Wrap up of today's papers"
- B. Co-Chairmen: **R. Komanduri, General Electric Co. and J. Samuel, University of Wisconsin—Madison**
1. "An Experimental Investigation of the Effect of a Fingerprint on Tool Force and Chip Formation During Orthogonal Cutting of Busbar Copper," **K. H. W. Seah, National University of Singapore and W. B. Rice, Queen's University, Kingston, Ontario, Canada.**
2. "Material Deformation Characterization at Moderate Strains and High Strain Rates from Metal Cutting Data," **D.R. Durham and B. F. von Turkovich, University of Vermont.**
3. "Wrap up of today's papers"

6:15 p.m.

### COCKTAILS

Union South

7:00 p.m.

### CONFERENCE BANQUET

Union South

## WEDNESDAY, MAY 25

8:30-10:00 a.m.

### SESSION 4

- A. Co-Chairmen: **K. J. Weinmann, Michigan Technological University and K. F. Eman, University of Wisconsin—Madison**
1. "An Investigation on the Mathematical-Modeling Technique used for Analyzing Industrial Metal-Working Processes," **J. C. Malas, J. T. Morgan, H. L. Gegel and J. S. Gunasekera, Wright-Patterson AFB and S. M. Doraivelu, Universal Energy Systems, Inc. and S. I. Oh, Battelle Columbus Laboratories.**
2. "Process Modeling of Hot-Die Forging—Experimental Verification Using a Computer-Controlled Press," **H. Rydstad and C. R. Boer, Brown Boveri Research Center, Baden, Switzerland.**
3. "Computer Aided Die Design for Upset Forging Machines," **M. J. Gokler and T. A. Dean, University of Birmingham, U. K. and W. A. Knight, University of Oxford, U. K.**
- B. Co-Chairmen: **John E. Mayer, Jr., Kennametal Inc. and R. A. Joseph, Republic Steel Corporation**
1. "Deep Hole Drill Wear Limits," **M. W. Burnham, Rockwell International.**
2. "Performance of Titanium Nitride Coated High-Speed Steel Drills," **W. E. Henderer, Vermont Tap & Die Company.**
3. "Deformation and Wear of Cemented Carbide Cutting Tools," **J. G. Baldoni, S. T. Buljan and V. K. Sarin, GTE Laboratories, Inc.**
- C. Co-Chairmen: **K. K. Wang, Cornell University and A. Thesen, University of Wisconsin—Madison.**
1. "Performance Testing of Irregular Parts Nesting Systems for Flame Cutting and Other Industrial Applications," **A. Bronsoiler and J. L. Sanders, University of Wisconsin—Madison.**
2. "A Generalized Model for Robotic Work Cell Design," **G. K. Hutchinson, University of Wisconsin—Milwaukee.**
3. "Computer Simulation of a Manufacturing System Under a Group Technology Environment Using SIMAN," **S. A. Pellegrino, C. D. Pegden and I. Ham, The Pennsylvania State University.**

10:00-10:30 a.m.

### REFRESHMENT BREAK

## Advanced Registration Form

NAMRC-XI May 24-26th, 1983



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Frank Lloyd Wright homes (5/24)

Arboretum Walk (5/24)

Milwaukee Pabst Mansion, Watts, Luncheon, Art Museum (5/25)

Additional banquet tickets @ \$15.00

Mail to: Professor M. F. DeVries

Chairman, NAMRC Organizing Committee

Mechanical Engineering Department

University of Wisconsin—Madison

1513 University Avenue

Madison, WI 53706