



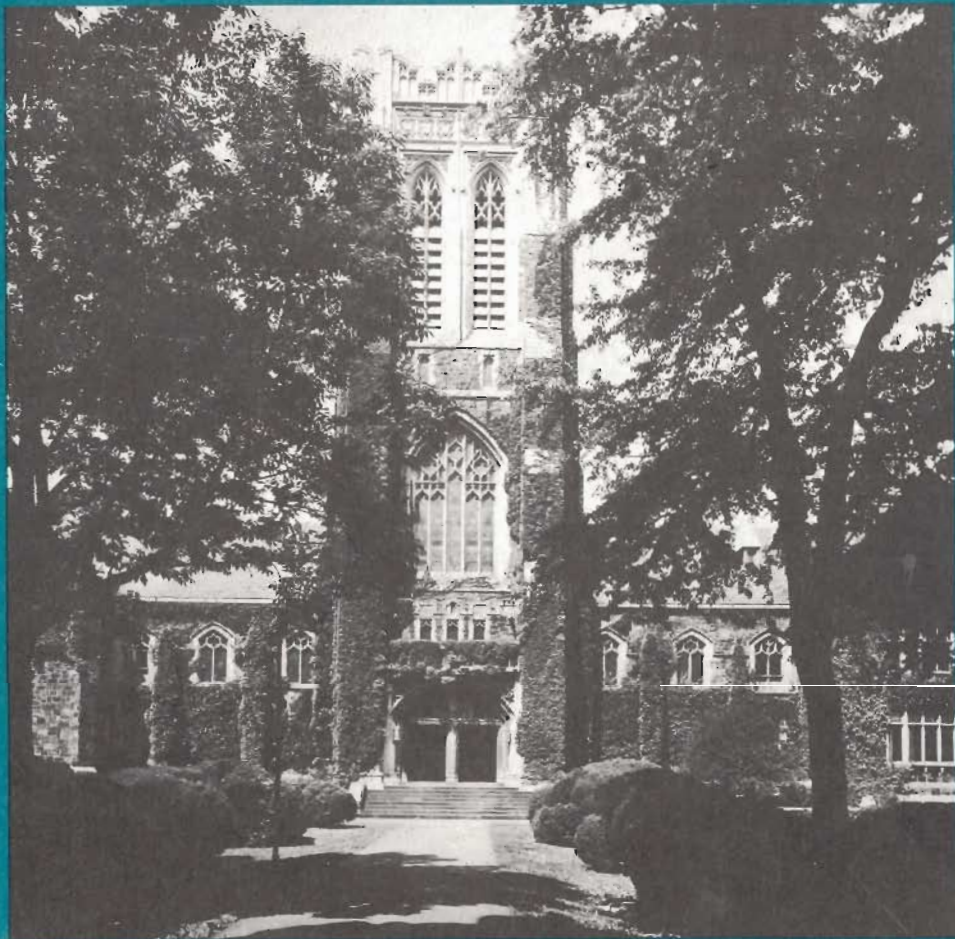
**NAMRI** SME

*North American Manufacturing  
Research Institute of SME  
announces*

**FIFTEENTH  
NORTH AMERICAN  
MANUFACTURING  
RESEARCH  
CONFERENCE  
AND  
ANNUAL MEETING**

**NAMRC XV**

May 27-29, 1987  
Lehigh University, Bethlehem,  
Pennsylvania, USA



# REGISTRATION AND GENERAL INFORMATION

## CONFERENCE PROSPECTUS

The Fifteenth North American Manufacturing Research Conference (NAMRC XV) is designed to provide a forum for the timely presentation and critical discussion of results of basic and applied research in metal working (machining and forming) and related manufacturing systems. The papers presented at this conference will describe research in the fields of metal forming, metal machining, grinding, non-traditional processes, machine tools, manufacturing systems, robotics, and related controls. All papers presented at the conference are contained in the bound conference *Proceedings* and document the research and development activities conducted in many of the important manufacturing research centers around the world.

The conference will consist of three paper tracks: forming (F), machining (M), and manufacturing systems (S). The paper sessions will consist of the formal presentation of the papers plus a discussion period that encourages interaction with the attendees. We urge you to attend and actively contribute.

## CONFERENCE LOCATION

The conference will be located in Neville Hall on the main campus of Lehigh University, located in the south side of Bethlehem, Pennsylvania. The campus is a ten minute drive from the Allentown-Bethlehem-Easton (A-B-E) Airport, the principal airport serving the Lehigh Valley.

## REGISTRATION AND CANCELLATION FEES

The registration fee for NAMRC XV is \$225 (U.S. dollars) for advance registration, and \$250 (U.S.) for at-the-door registration on May 27, 28, and 29. The fee includes entrance to all technical sessions, refreshments, three luncheons, the conference banquet, and a bound copy of the conference proceedings. There will be no one-day registration fees nor will there be any reduced fees for authors or session chairs.

Graduate student registration fee is \$100 (U.S.) or \$125 (U.S.) at the door. This fee is a special rate to encourage attendance by graduate students, and includes all technical sessions, refreshments, three luncheons, the conference banquet, and a bound copy of the conference proceedings. Students can register to attend only the paper sessions for \$10.

Advanced registration should be confirmed in writing. Refunds, minus a \$25 cancellation fee, will be made to those cancelling their registration at least five working days prior to the conference. No refunds will be granted after May 19, 1987. Substitutions will be accepted at any time. For additional information, contact Prof. Mikell Groover at (215) 758-4030 or Mrs. Fern Sotzing at (215) 758-4114.

## TO REGISTER

Complete and return the registration form at the end of this announcement with proper fee. Checks, money orders, or purchase orders should be made payable to Lehigh University and mailed to Mrs. Fern Sotzing, Mohler Building 200, Lehigh University, Bethlehem, PA 18015. Sorry, credit cards cannot be accepted.

## TRANSPORTATION TO CONFERENCE

For those intending to drive to the conference, the major highways passing through the Lehigh Valley are Interstate 78 and the Northeast Extension of the Pennsylvania Turnpike.

Air service to Bethlehem and the Lehigh Valley is provided by Allegheny Commuter, Continental Express, Eastern, Eastern Express, Henson/Piedmont, Northwest, United, and U.S. Air through the Allentown-Bethlehem-Easton (A-B-E) Airport. There are daily direct flights between A-B-E and Philadelphia, Pittsburgh, Chicago, Washington, and other cities. In addition, Newark International Airport is approximately 1.5 hours by car and Philadelphia International Airport is about 2.5 hours by car.

## LODGING

The official hotel for the conference is the Bethlehem Hotel, located in downtown Bethlehem, about a half-mile from the Lehigh University campus. A block of 75 rooms has been reserved for conference participants at the Bethlehem Hotel. This block will be released after May 8, 1987. Other lodging is also available to meet the individual needs of registrants. The following is a listing of available lodging alternatives. Conference attendees are urged to make their own reservations as early as possible. To receive the special conference room rates (where applicable), be sure to mention that you will be attending the North American Manufacturing Research Conference at Lehigh University.

**Bethlehem Hotel** (Official NAMRC XV Hotel): 437 Main Street, Bethlehem, PA 18018. Telephone (215) 867-3711. Rates: \$50/single, \$60/double, plus tax. Approximately 0.5 mile to campus, 5 miles from A-B-E Airport. Airport limousine service available for hotel guests.

The following are lodging alternatives to the Bethlehem Hotel:

**On-campus:** Taylor Hall (a Lehigh University residence hall), air-conditioned, common bathroom, full maid service, continental breakfast available. Rate: \$22.25/single, \$34/double (twin beds). Telephone (215) 758-3510. (5 minute walk to conference).

**Bethlehem Holiday Inn:** Rts. 22 and 512, Bethlehem, PA 18017. Telephone (215) 866-5800. Rates: \$54/single, \$60/double, plus tax. Approximately 5 miles from campus, 4 miles from A-B-E Airport. Airport limousine service available for hotel guests; direct phone line from baggage area at airport.

**Comfort Inn:** Rts. 22 and 191, Bethlehem, PA 18017. Telephone (215) 865-6300. Rates: \$29.95/single, \$32.95/double, plus tax. Approximately 6 miles to campus, 5 miles from A-B-E Airport. No airport limousine service available.

## AIRPORT/HOTEL TRANSPORTATION

Information on airport limousine service for hotel guests is indicated for each of the above hotels. Taxi service is available from the airport by calling the Lehigh Valley Taxi Company at 867-5855. One-way taxi fare to campus from A-B-E Airport is about \$10.00 for one passenger and \$4.00 for each additional passenger. The major car rental companies are available at the A-B-E Airport.

## VAN SERVICE FOR CONFERENCE

Complimentary van shuttle service will be available between the individual hotels and the conference location. Contact the hotel desk or the conference registration desk for more information.

## PARKING

Parking on the Lehigh University campus should be no problem in late May. However, it is required that you display a Visitor's Parking Pass on your vehicle to use the University Parking Lots. Please indicate on the Registration Form if you will need a Visitor's Parking Pass.

## WEATHER AND DRESS

Lehigh University is located in Bethlehem in Eastern Pennsylvania. The weather should be pleasant in late May—usually sunny with an average temperature around 68 degrees. However, there can be periods of rain, so bring an umbrella. Walking shoes and a light jacket will be appropriate for this environment.

## CONFERENCE INFORMATION CENTER AND INCOMING MESSAGES

General conference information can be obtained by calling Fern Sotzing at (215) 758-4114 during regular business hours, or by calling the Lehigh University Conference Services Desk at (215) 758-4398 from 7:00 a.m. to 8:00 p.m.

Incoming messages for conference attendees will be accepted at (215) 758-4114 and posted on a bulletin board near the conference registration area. Sessions will not be interrupted to relay messages.

## SPOUSE'S PROGRAM

A Spouse's Program will be available for those interested. The program will include a tour of the beautiful Lehigh Valley (Wednesday), a day trip to Bucks County for shopping and a play (Thursday), and a special breakfast (Friday). The fee for this program is \$50.00, plus \$25.00 for the Wednesday evening NAMRI Banquet.

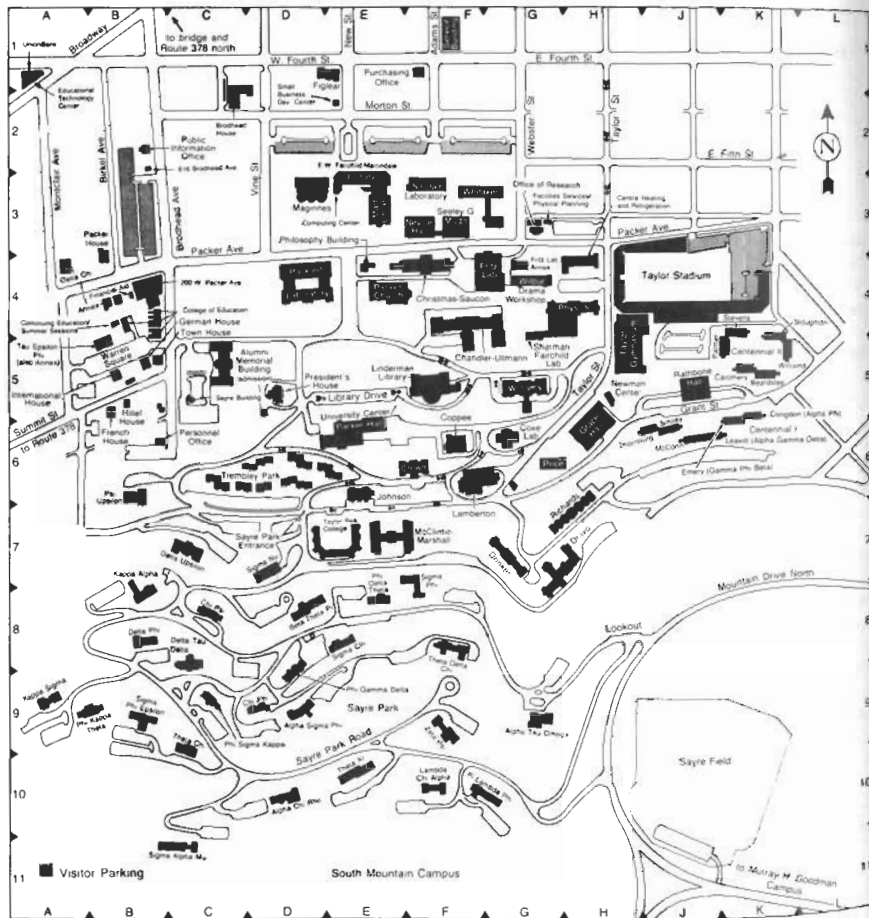
## PROCEEDINGS

All registered conference participants will receive one bound copy of the NAMRC XV Proceedings at conference registration. Additional copies may be purchased at the conference or, after June 1, by mail order through the Society of Manufacturing Engineers, One SME Drive, P.O. Box 930, Dearborn, Michigan 48121 USA. Phone (313) 271-1500, Ext. 418. The cost per copy is \$55 for NAMRI/SME and SME members, \$65 for non-members.

## RELATED CONFERENCES

- CIRP International Seminar on Manufacturing Systems (Major Theme: Computer Automated Process Planning) to be held June 1-2, 1987, at Pennsylvania State University, University Park, PA.
- International Conference on the Manufacturing Science and Technology of the Future (sponsored by Massachusetts Institute of Technology) to be held June 3-5, 1987 at MIT, Cambridge, MA.

These two conferences are being scheduled immediately following NAMRC XV for the convenience of our international visitors.



Fifteenth North American  
Manufacturing Research  
Conference and Annual  
Meeting—May 27-29, 1987

# TECHNICAL SESSIONS AND PROGRAM

---

## TUESDAY, MAY 26

5:00-8:00 p.m.

### Registration and Reception

6:30-10:00 p.m.

### NAMRI/SME Board of Directors Dinner and Meeting

Hotel Bethlehem, Lehigh Valley Suite East

---

## WEDNESDAY, MAY 27

8:00-9:00 a.m.

### Registration

Lobby, Neville Hall, Lehigh University Campus  
(Coffee and donuts served)

9:00-10:15 a.m.

General Session

Room: Neville 1

### Introductions

#### Mikell P. Groover

Professor of Industrial Engineering  
Lehigh University

### Welcoming Remarks:

#### Donald M. Bolle

Dean, College of Engineering and Physical  
Sciences

Lehigh University

#### B.F. von Turkovich

President, NAMRI/SME  
Chairman of Mechanical Engineering  
University of Vermont

### Keynote Address:

**"Automated Manufacturing Research Facility  
at NBS as a Test Bed for Manufacturing  
Research"**

*John A. Simpson*

Director, Center for Manufacturing Engineering  
National Bureau of Standards

10:15-10:30 a.m.

Coffee Break

Lobby, Neville Hall

10:30-12:00 noon

### Three Parallel Sessions

Session: S/Wed1 (Systems)—Management, GT,  
and CAPP

Room: Neville 1

**Co-Chairmen:** *N. G. Odrey*, Lehigh University,  
Bethlehem, PA; and *Y. Koren*, University of Mich-  
igan, Ann Arbor, MI

1. **"Managing Complexity in Automated Systems: An Information Measure and Its Application,"** *S. H. Kim*, Massachusetts Institute of Technology, Cambridge, MA
2. **"Development of an In-House Computer Automated Process Planning System Based on Group Technology Concept,"** *C. Han, J. Li, and I. Ham*, The Pennsylvania State University, University Park, PA
3. **"An Integrated CAPP and Scheduling System,"** *L. Zhao*, Zhenjiang Shipbuilding Institute, Jiangsu, PRC; and *L. Kops*, McGill University, Montreal, Canada

Session: M/Wed1 (Machining)—Non-Traditional  
Machining  
Room: Neville 2

**Co-Chairmen:** *K. Weinmann*, Michigan Techno-  
logical University, Houghton, MI; and *G. Sathya-  
narayanan*, Lehigh University, Bethlehem, PA

1. **"A Study on the Profile Reproduction in Ultrasonic Machining,"** *V. Soundararajan*, Engineering College, Pondicherry, India; and *V. Radhakrishnan*, IIT, Madras, India
2. **"A Study of Characteristics of Electrical Discharges in EDM,"** *K. P. Rajurkar and J. E. Springer*, University of Nebraska, Lincoln, NE
3. **"A Contribution to the Monitoring and Control of EDM Based on High Frequency Methods,"** *K. K. Hon and E. S. Razavi*, University of Birmingham, Birmingham, AL

Session: F/Wed (Forming)—Analytical Methods  
Room: Neville 3

**Co-Chairmen:** *T. Altan*, Ohio State University,  
Columbus, OH; and *M. Kiuchi*, University of  
Tokyo, Japan.

1. **"Application of the Force Balance Method to Several Metal Forming Problems,"** *B. Avitzur*, Lehigh University, Bethlehem, PA; *J. C. Choi*, Pusan National University, Pusan, S. Korea; and *J. M. Kim*, University of Ulsan, S. Korea

2. "Injection Upsetting—An Upper Bound Analysis," *W. A. Gordon*, The Torrington Company, A Division of Ingersoll Rand, Torrington, CT; and *C. J. Van Tyne*, Lafayette College, Easton, PA
3. "Computer Applications in the Design and Manufacture of Injection Molds for Plastics," *K. K. Wang*, Cornell University, Ithaca, NY

12:00-1:25 p.m.

Luncheon

Asa Packer Room, 3rd floor, University Center  
Lehigh University Campus

1:30-3:00 p.m.

*Three Parallel Sessions*

Session: S/Wed2 (Systems)—Machine Tool  
Technology

Room: Neville 1

**Co-Chairmen:** *K. Nyamekye*, Auburn University, Auburn, AL; and *V. Radhakrishnan*, IIT—Madras, India

1. "Study of Oil-Air Lubrication of High-Speed Ball Bearing Systems for Machine Tool Application," *T. Aoyama* and *I. Inasaki*, Keio University, Japan
2. "A Comparative Study of the Identification of Dynamic Characteristics of the Headstock, Toolpost, and Tailstock of a Lathe," *A. C. Okafor*, University of Missouri—Rolla, Rolla, MO; and *S. M. Pandit*, Michigan Technological University, Houghton, MI
3. "A New On-Line Measurement System for Machine Tool Geometric Errors," *J. Ni* and *S. M. Wu*, University of Wisconsin—Madison, Madison, WI

Session: M/Wed2 (Machining)—Dynamic  
Modeling in Machining

Room: Neville 2

**Co-Chairmen:** *I. Ham*, Pennsylvania State University, University Park, PA; and *B. E. Klamecki*, University of Minnesota, Minneapolis, MN

1. "Present and Future Trends in Stochastic Analysis of Cutting and Structural Dynamics," *K. F. Eman*, Northwestern University, Evanston, IL; and *S. M. Wu*, University of Wisconsin—Madison, Madison, WI

2. "A Non-Contacting Active Damper for Precision Cylindrical Traverse Grinding," *K. Mori*, *H. Inoue*, *T. Suto*, and *T. Waida*, Ministry of International Trade and Industry, Namiki, Sakuramura, Niihari-gun, Ibaraki, Japan

3. "A Model for the Prediction of Force System for Cylinder Boring Process," *G. Subramani*, *R. Suvada*, *S. G. Kapoor*, *R. E. DeVor*, University of Illinois at Urbana—Champaign, Urbana, IL; and *W. Meingast*, The Ingersoll Milling Machine Company, Rockford, IL

Session: F/Wed2 (Forming)—Numerical  
Procedures

Room: Neville 3

**Co-Chairmen:** *C. Van Tyne*, Lafayette College, Easton, PA; and *G. D. Lahoti*, Timken Company, Canton, OH

1. "The Use of a Finite-Element Model to Describe Wave Propagation in a Hopkinson Bar Apparatus," *Major D. R. Hamilton*, The Royal Military College of Canada, Kingston, Ontario, Canada
2. "Application of Three-Dimensional Finite Element Analysis to Metal Forming Processes," *J. J. Park* and *S. I. Oh*, Battelle Columbus Division, Columbus, OH
3. "Three Dimensional Bit-map Geometry Processor for CAD/CAM Application," *K. Yamazaki*, *H. Suzuki*, *M. Fujio*, and *Y. Nogutchi*, Toyohashi University of Technology, Toyohashi, Japan

3:00-3:30 p.m.

Coffee and Coke Break  
Lobby, Neville Hall

3:30-5:00 p.m.

*Three Parallel Sessions*

Session: S/Wed3 (Systems)—Machine Tool  
Controls

Room: Neville 1

**Co-Chairmen:** *S. Pandit*, Michigan Technological University, Houghton, MI; and *G. Tonkay*, Lehigh University, Bethlehem, PA.

1. "Optimal, Variable Gain Adaptive Control System for Turning," *O. Masory* and *S. B-H Lin*, Texas A&M University, College Station, TX

2. "Multivariable Analysis of Multi-Axial Machine Tool Feed Drive Controller," *K. Srinivasan*, Ohio State University, Columbus, OH

3. "A Method to Construct Three-Dimensional Stability Border Surfaces," *G. M. Zhang*, Beijing Institute of Printing, Beijing, the People's Republic of China; *S. G. Kapoor* and *R. E. DeVor*, University of Illinois at Urbana—Champaign, Urbana, IL

Session: M/Wed3 (Machining)—Chatter and  
Process Control in Machining

Room: Neville 2

**Co-Chairmen:** *K. Srinivasan*, Ohio State University, Columbus, OH; and *K. P. Rajurkar*, University of Nebraska, Lincoln, NE.

1. "An Extra-Long Cantilever Boring Bar with Enhanced Chatter Resistance," *E. I. Rivin* and *X-Z. Wu*, Wayne State University, Detroit, MI

2. "Prediction of the Onset of Chatter for Turning Process Control," *A. L. Carlson*, *W. F. Lu*, and *B. E. Klamecki*, University of Minneapolis, MN

3. "Tool Path Error Control in Thin Rib Machining," *M. Anjanappa*, *J. A. Kirk*, and *D. K. Anand*, University of Maryland, College Park, MD

Session: F/Wed3 (Forming)—Surface  
Phenomena

Room: Neville 3

**Co-Chairmen:** *A. T. Male*, Westinghouse R&D Center, Pittsburgh, PA; and *M. Murakawa*, Nippon Institute of Technology, Japan

1. "Models for Friction in Metal Forming," *N. Bay*, *T. Wanheim*, and *B. Avitzur*, Lehigh University, Bethlehem, PA
2. "Experimental Examination of Finite Element Deformation Analysis in the Flattening of Surface Asperities by Flat Rigid Dies," *M. Murakawa* and *N. Koga*, Nippon Institute of Technology, Japan; and *A. Makinouchi* and *H. Ike*, Institute of Physical and Chemical Research, Japan
3. "Investigation of Die Wear in Upsetting Using the FEM Code ALPID," *O. C. Vardan*, *A. Bagchi* and *T. Altan*, Ohio State University, Columbus, OH

6:00-7:00 p.m.

Reception

Faculty Lounge, Third Floor, University Center  
Chamber Music by Anime

7:00-9:00 p.m.

Conference Banquet

Asa Packer Room, 3rd Floor, University Center

---

## THURSDAY, MAY 28

8:00-8:30 a.m.

Coffee and donuts  
Lobby, Neville Hall

8:30-9:30 a.m.

General Session  
Room: Neville 1

Introductions:

*Betzalel Avitzur*

Professor of Material Science and Engineering  
Lehigh University

Keynote Address:

"Cold Forging—Past, Present, and Future"  
*Hideaki Kudo*

*Professor of Mechanical Engineering  
Yokohama National University, Japan*

9:30-10:00 a.m.

Coffee Break  
Lobby, Neville Hall

10:00-12:00 noon

*Three Parallel Sessions*

Session: S/Thr1 (Systems)—Flexible Systems for Design and Production

Room: Neville 1

**Co-Chairmen:** *R. N. Nagel*, Lehigh University, Bethlehem, PA; and *P. Cohen*, Pennsylvania State University, University Park, PA.

1. "Rational Approach in the Design Analysis of Flexible Fixtures for an Unmanned Cell," *K. Nyamekye*, Auburn University, Auburn, AL
2. "The Design and Management of Tool Handling Services for Flexible Manufacturing," *G. M. Acaccia*, *R. C. Michelini*, *R. M. Molfino*, *M. G. Russo*, and *G. Voiello*, University of Genoa, Italy
3. "Mechanical Design Simplification Using Function Description Language," *K. Lai*, Northwestern University, Evanston, IL

Session: M/Thr1 (Machining)—Sensors and Tool Monitoring

Room: Neville 2

**Co-Chairmen:** *G. E. Kane*, Lehigh University, Bethlehem, PA; and *D. A. Dornfeld*, University of California, Berkeley, CA.

1. "Material Dependency of Chip-Form Detection Using Acoustic Emission," *K. W. Yee*, National Bureau of Standards, Gaithersburg, MD
2. "Monitoring Tool Wear Through Force Measurement," *Y. Koren*, *K. Danai*, *A. G. Ulsoy*, and *T-R Ko*, University of Michigan, Ann Arbor, MI
3. "Dynamic Modeling of Face Mill Arbor and Turning Tool Support Assembly for Tool Condition Monitoring," *T. Shi*, *S. Ramalingam*, and *D. Frohrib*, University of Minnesota, Minneapolis, MN

4. "On Real-Time Tool Fracture Monitoring in Milling," *D. Grieshaber*, *S. Ramalingam*, and *D. Frohrib*, University of Minnesota, Minneapolis, MN

Session: F/Thr1 (Forming)—Sheet Forming 1

Room: Neville 3

**Co-Chairmen:** *N. Bay*, Lehigh University, Bethlehem, PA; and *R. P. McDermott*, MSP Industries Corp., Dearborn, MI.

1. "Analysis of Multi-Stage Sheet Metal Forming Processes," *S. A. Majlessi* and *D. Lee*, Rensselaer Polytechnic Institute, Troy, NY
2. "A General Method for Analysis of Pressure Forming of Viscoplastic Sheet Metal Under Plane Strain Condition," *Z. J. Luo*, *N. C. Guo*, Northwestern Polytechnical University, China; and *Q. Y. Gong*, Huanghe Machinery Manufacturing Factory, China
3. "Rectangular Cup Drawing of Strain Rate-Sensitive Sheet Materials," *C. H. Toh*, *W. T. Carter, Jr.* and *L. R. Kaisand*, General Electric Company, Schenectady, NY
4. "Hole Flanging of Hot-Rolled Bonded Composite Metallic Plates, The Influence of Plastic Anisotropy on Lip Thickness and Fracture," *N. R. Chitkara*, University of Manchester Institute, Manchester, England
5. "The Maximum Drawing Ratio in Hydro-forming Deep-Drawing Process," *S. Yossifon*, Technion, Haifa, Israel

12:00-1:25 p.m.

NAMRI/SME Luncheon

Asa Packer Room, University Center, Lehigh University Campus

1:30-2:30 p.m.

*Three Parallel Sessions*

Session: S/Thr2 (Systems)—Sculptured Surfaces and Solid Modeling

Room: Neville 1

**Co-Chairmen:** *T. Ozsoy*, Lehigh University, Bethlehem, PA; and *S. Kapoor*, University of Illinois, Urbana, IL.

1. **"The Application of Solid Modeling to Manufacturing Engineering Problems,"** *E. A. Lehtihet*, Pennsylvania State University, University Park, PA; and *D. M. Aber*, IBM Corporation, Endicott, NY and Lehigh University, Bethlehem, PA
2. **"Machining Sculptured Surfaces in the Subcontracting Industry,"** *J. P. Kruth*, WTCM/CRIF, Research Center of the Belgian Metalworking Industries

Session: M/Thr2 (Machining)—Grinding  
Room: Neville 2

**Co-Chairmen:** *R. P. Lindsay*, Norton Co., Worcester, MA; and *S. Malkin*, University of Massachusetts, Amherst, MA

1. **"Diamond Mill Dressing—A New Technique for Dressing Grinding Wheels,"** *I. G. Warnecke*, *F. J. Grun*, and *P. Mertens*, University of Kaiserslautern, West Germany
2. **"An Investigation into the Mechanics of Diamond Grinding of Brittle Materials,"** *S. Chandrasekar*, Purdue University, West Lafayette, IN; and *G. Sathyanarayanan*, Lehigh University, Bethlehem, PA

Session: F/Thr2 (Forming)—Sheet Forming 2  
Room: Neville 3

**Co-Chairmen:** *W. B. Rice*, Queen's University, Canada; and *J. Story*, Alcoa Research Center, Pittsburgh, PA

1. **"Determining Flow Curves of Thin Sheet Metal by the Plane Torsion Test,"** *K. Lange* and *M. Bauer*, Universitat Stuttgart, FRG
2. **"The Validity of the Tensile Anisotropy Ratio in Biaxial Stretching of Sheet Metal,"** *J. C. Gerdeen*, *K. L. Weinmann*, *M. Walling*, Michigan Technological University, Houghton, MI; and *S. Brondich*, Alcoa Laboratories, Pittsburgh, PA

2:30-2:45 p.m.  
Coffee and Coke Break  
Lobby, Neville Hall

2:45-3:45 p.m.  
*Three Parallel Sessions*  
Session: S/Thr3 (Systems)—CAD for Manufacturing  
Room: Neville 1

**Co-Chairmen:** *J. B. Ochs*, Lehigh University, Bethlehem, PA; and *E. A. Lehtihet*, Pennsylvania State University, University Park, PA.

1. **"Solid Freeform Fabrication and Selective Powder Sintering,"** *C. R. Deckard*, The University of Texas at Austin, TX
2. **"Integration of CAD and Inspection for Mold Production and Rework,"** *N. A. Duffie*, *J. A. Kann*, and *S. C. Feng*, University of Wisconsin—Madison, Madison, WI

Session: M/Thr3 (Machining)—Machining Process Research  
Room: Neville 2

**Co-Chairmen:** *B. F. von Turkovich*, University of Vermont, Burlington, VT; and *R. Komanduri*, National Science Foundation, Washington, DC

1. **"An Improved Finite Element Model of Orthogonal Metal Cutting,"** *J. S. Strenkowski* and *G. L. Mitchum*, North Carolina State University, Raleigh, NC
2. **"A Study of Cutting Temperature in Ultra-High Precision Diamond Cutting of Copper (OFC),"** *K. Iwata*, *T. Moriwaki*, and *K. Okuda*, Kobe University, Rokko, Nada, Kobe, Japan

Session: F/Thr3 (Forming)—Complex Bulk Deformation  
Room: Neville 3

**Co-Chairmen:** *A. E. Bayoumi*, Washington State University, Pullman, WA; and *R. Kohser*, University of Missouri—Rolla, MO

1. **"On the Impact Engraving of Metal Blanks,"** *J. Tirosh* and *A. Dayan*, Israel Institute of Technology, Haifa, Israel
2. **"Complex Simulation System of Three-Dimensional Forging,"** *M. Kiuchi*, University of Tokyo, Japan; and *T. Imai*, Nippon Denso Co. Ltd., Japan

3. **"Incremental Forging of Shaped Heads from Cylindrical Rod Specimens: Some Experiments and an Analysis,"** *N. R. Chitkara*, University of Manchester Institute, Manchester, England

3:45-5:00 p.m.  
Lab Tours—Interested persons should assemble in the lobby  
Neville Hall

4:30 p.m.  
ASME Production Engineering Division Executive Committee Meeting  
Room: Neville 3

5:00-6:00 p.m.  
Wine and Cheese Reception  
Maginnes Hall Lobby  
6:00-7:30 p.m.  
NAMRI General Membership Meeting (NAMRI Annual Meeting)  
Room: Neville 1

---

## FRIDAY, MAY 29

8:30-10:00 a.m.  
*Three Parallel Sessions*  
Session: S/Fri1 (Systems)—Robotic Work Cells  
Room: Neville 1

**Co-Chairmen:** *B. Nnaji*, University of Massachusetts, Amherst, MA; and *M. Martinez-Heath*, *SRI International*, Princeton, NJ

1. **"Use of Group Technology in Robot Gripper Selection,"** *W. R. D. Wilson* and *K. T. Tan*, Northwestern University, Evanston, IL
2. **"An Improved Model for the Cost of Product Assembly Using a Flexible Robotic Workstation,"** *F. M. Kolarits* and *W. R. DeVries*, Rensselaer Polytechnic Institute, Troy, NY
3. **"A Microcomputer Assisted Robotic Cell for Automated Assembly,"** *Z. Katz* and *G. Braby*, University of Natal, Durban, R.S.A.

Session: M/Fri1 (Machining)—Machinability and Tool Performance  
Room: Neville 2



**Co-Chairmen:** *S. Ramalingam*, University of Minnesota, Minneapolis, MN; and *E. W. Zimmers, Jr.*, Lehigh University, Bethlehem, PA

1. "A Study of Cracks, Pores, and ETA Phase Carbides in Coated Carbide Tools," *V. C. Venkatesh*, National University of Singapore, Singapore
2. "The Machinability of Soft Magnetic Materials," *G. Spur* and *G. Byrne*, Technische Universität, Berlin, Germany
3. "The Influence of Porosity on the Machinability of Powder Metallurgy 304L Stainless Steel Using Cutting Forces," *J. S. Agapiou*, G.M. Technical Center, Warren, MI; *G. W. Halldin*, Texas A&M University, College Station, TX; and *M. F. DeVries*, University of Wisconsin, Madison, WI

Session: F/Fri1 (Forming)—Failure, Instability, and Surface Temperature  
Room: Neville 3

**Co-Chairmen:** *K. Lange* and *M. Bauer*, Universität Stuttgart, FRG; and *H. Kudo*, Yokohama National University, Yokohama, Japan

1. "Experimental Measurements of Billet Surface Temperatures in Rolling," *N. Parker* and *J. Jeswiet*, Queen's University, Kingston, Ontario, Canada

2. "How to Avoid Shearing Defects—Workpiece Properties, Tool and Machine Parameters," *H. Fleischer*, University of Hannover, Federal Republic of Germany

3. "Plastic Instability Study of 70/30 Cartridge Brass Through a New Computerized Testing Method," *R. Frank* and *A. E. Bayoumi*, Washington State University, Pullman, WA

10:00-10:30 a.m.

Coffee Break

Lobby, Neville Hall

10:30-12:00 noon

Three Parallel Sessions

Session: S/Fri2 (Systems)—Robot Accuracy  
Room: Neville 1

**Co-Chairmen:** *N. D. Pereira*, Lehigh University, Bethlehem, PA; and *W. R. DeVries*, Rensselaer Polytechnic Institute, Troy, NY

1. "The Compliance Effector: An Adjustable Remote Center of Compliance Device Using an Electrorheological Fluid," *P. L. Campbell*, IBM, East Fishkill, NY; and *M. S. Darlow*, Rensselaer Polytechnic Institute, Troy, NY

2. "Robot Accuracy and Its Improvement—An Experimental Investigation," *M. C. Leu*, Cornell University, Ithaca, NY; and *V. Dukovski*, University of Skopje, Skopje, Yugoslavia

3. "Improvement of Accuracy in Robotic Contouring Using a Pre-Gain Control Factor," *D. W. Wu* and *S. Nebergall*, University of Illinois at Chicago, Chicago, IL

Session: M/Fri2 (Machining)—Panel: Research Issues in Metal Machining  
Room: Neville 2

Co-Chairs: *G. E. Kane* and *G. Sathyanarayanan*, Lehigh University, Bethlehem, PA

Session: F/Fri2 (Forming)—Panel: Research Issues in Metal Forming

Room: Neville 3

Co-Chairs: *B. Avitzur*, Lehigh University, Bethlehem, PA; and *C. Van Tyne*, Lafayette College, Easton, PA

12:00-1:15 p.m.

Luncheon

Asa Packer Room, University Center, Lehigh University Campus

Conference Ends

1:15-3:00 p.m.

Laboratories open for informal visits



## 1986-1987 NAMRI/SME BOARD OF DIRECTORS

### PRESIDENT

**B. F. von Turkovich**  
University of Vermont

### VICE PRESIDENT

**T. Altan**  
Ohio State University

### SECRETARY

**D. A. Dornfeld**  
University of  
California—Berkeley

### PAST PRESIDENT

**I. Ham**  
Pennsylvania State  
University

### EX OFFICIO

**J. E. Mayer, Jr.**  
Society of Manufacturing  
Engineers

### EXECUTIVE DIRECTOR

**G. Korte**  
NAMRI/SME

### DIRECTORS

**W. R. DeVries**  
Rensselaer Polytechnic

**G. D. Lahoti**  
The Timken Company

### L. Kops

McGill University  
**A. T. Male**  
Westinghouse Electric  
Company

**K. J. Weinmann**  
Michigan Technological  
University

**W. J. Zueblin**  
Metcut Research Associates  
Inc.

## NAMRC XV SCIENTIFIC COMMITTEE

**K. J. Weinmann**  
(Chairman)  
Michigan Technological  
University

**B. Avitzur**  
Lehigh University

**R. E. DeVor**  
University of Illinois—Urbana

**M. F. DeVries**  
University of  
Wisconsin—Madison

**D. R. Durham**  
Oklahoma State University

**R. S. Hahn**  
Hahn Associates

**S. Kalpakjian**  
Illinois Institute of Technology

**B. E. Klamecki**  
University of Minnesota

**R. Komanduri**  
General Electric Company

**Y. Koren**  
University of Michigan

**R. P. Lindsay**  
Norton Company

**S. Ramalingam**  
University of Minnesota

**W. B. Rice**  
Queen's University

**J. A. Schey**  
University of Waterloo

**K. Srinivasan**  
Ohio State University

**J. M. Story**  
Aluminum Company of  
America

**G. Sathyanarayanan**  
Lehigh University

**J. Tlusty**  
University of Florida

## NAMRC XV ORGANIZING COMMITTEE

Lehigh University  
Bethlehem, Pennsylvania

**K. M. Anselmin**  
**B. Avitzur** (Co-Chairman)

**M. P. Groover** (Co-Chairman)

**D. J. Hillman**

**G. E. Kane**

**R. N. Nagel**

**J. B. Ochs**

**N. G. Odrey**

**T. Ozsoy**

**N. D. Perreira**

**G. Sathyanarayanan**

**G. L. Tonkay**

**C. Van Tyne**

**E. W. Zimmers, Jr.**

# REGISTRATION FORM

NAMRC XV-MAY 27-29, 1987

Name \_\_\_\_\_  
(Last) (First)

Company/University \_\_\_\_\_

Office Address \_\_\_\_\_

City/State/Zip \_\_\_\_\_

Telephone (\_\_\_\_\_) \_\_\_\_\_

Enclosed is payment and/or Purchase Order for NAMRC XV as follows:

\_\_\_ Conference Registrations at \$225 U.S.  
per person \$ \_\_\_\_\_

\_\_\_ Additional banquet tickets at \$25 U.S.  
per person \$ \_\_\_\_\_

\_\_\_ Spouse's Program at \$50—details in  
announcement \$ \_\_\_\_\_  
(Spouse's Program does not include banquet)

\_\_\_ Graduate student registration at  
\$100 U.S. \$ \_\_\_\_\_  
(Full conference)

\_\_\_ Graduate student registration at  
\$10 U.S. \$ \_\_\_\_\_  
(Technical sessions only)

Total Payment \$ \_\_\_\_\_

\_\_\_ Check here if you will have a car and will need a Visitor's Parking Pass for University parking.

\_\_\_ Please check if you have any special dietary requirements, and indicate the nature of these requirements below.  
\_\_\_\_\_

\_\_\_ Please check here if you are a handicapped person requiring special considerations, and indicate the nature of these considerations below.  
\_\_\_\_\_

Checks, money orders, or purchase orders should be made payable to Lehigh University and mailed to Mrs. Fern Sotzing, Mohler Building 200, Lehigh University, Bethlehem, PA 18015. Sorry, credit cards not accepted.

For additional information, contact Prof. Mikell Groover at (215) 758-4030 or Mrs. Fern Sotzing at (215) 758-4114.