



**International Institution for Production Engineering Research**

# **NEWSLETTER**

**N° 22 - April 2003**

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# From the Editor

The 53<sup>rd</sup> General Assembly in Montréal is already close ahead. The organisation committee has worked hard to welcome you warmly. Should you have not registered yet, this might be a good moment to do so.

We will not be surprised by a thick pile of paper from Paris to prepare ourselves this year. This is because we are in the electronic era now. That means that we can decide by ourselves what we need and that we can pick it up from CIRPnet easily. You will have experienced that CIRPnet is still improving. There were surprisingly few reactions on this new procedure up to now.

The next issue of the Newsletter is scheduled for October 2003. It is open for more input from the membership. Your contributions are much appreciated; you may send it to the CIRP office in Paris or directly to the editor at: [j.meijer@utwente.nl](mailto:j.meijer@utwente.nl) preferable before **September 15<sup>th</sup> 2003**

Johan Meijer (Technical Secretary)

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# 1. About CIRP



The International Institution for Production Research (CIRP) was founded in 1951 to bring together research workers studying the application of scientific methods to production technology.

At present, CIRP has about 500 members representing some 40 different countries. The unique contribution of CIRP to manufacturing research is acknowledged by many of the world's leading companies and research institutes, who provide active support through the

associate membership. Today, CIRP is turning its attention to the use of computerized methods for manufacturing control, automation, robotics, interfacing and the computer-integrated factory of the future. The CIRP is organised in Scientific and Technical Committees (STC's) that are the groups responsible for coordinating the collaborative research. The main activities are:

- Studying new techniques and technologies;
- Organising cooperative research projects, comparative testing and standardisation;
- Collecting and analysing bibliographies on manufacturing;
- Publishing synthesis reports on important technical problems;
- Organising seminars and meetings on specialist topics;
- Preparing internationally accepted terminology;
- Contributing to the work of the International Standardisation Organisation;
- Surveying the state of the art of research in different laboratories over the world;

The Scientific and Technical Committees (STC's) are:

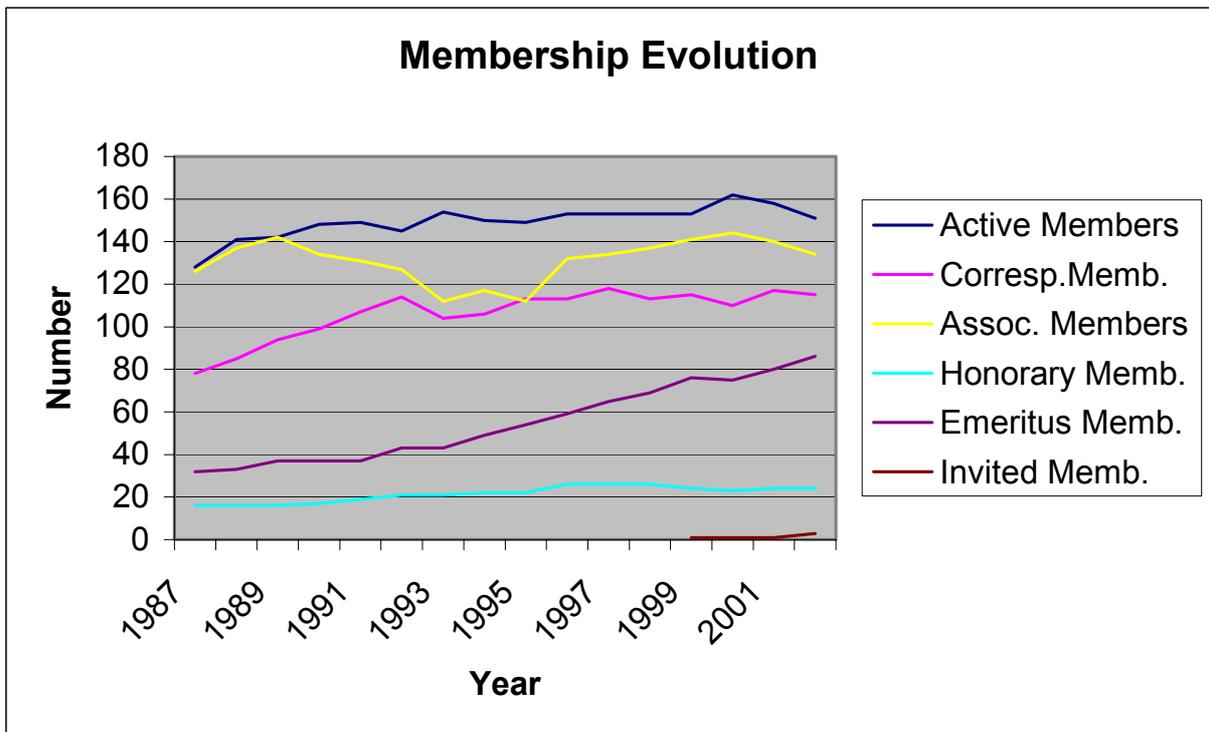
- A: Assembly
- C: Cutting
- Dn: Design
- D: Dictionary
- E: Electro-Physical and Chemical processes
- F: Forming
- G: Abrasive Processes
- M: Machines
- O: Optimisation of manufacturing systems
- P: Precision engineering and metrology
- S: Surfaces

## 2. The Board



The traditional picture of the 'old' and the 'new' Presidents on the stairs in 9 rue Mayran.

One of the topics of the January meetings was the development of the membership. There is a steady growth of the membership as shown below, but what is not shown in the figure is the development of age. This topic will certainly be presented at the next General Assembly Meeting.



## CIRP Promotion Presentation

A promotion presentation is being compiled in PowerPoint format, and will be available for members who want to add some CIRP promotion material in CIRP sponsored conferences. It contains:

- The history
- Aims and field of work
- The organization
- Membership
- Represented countries
- STC's and their scope
- Publications
- Collaboration network

This promotion presentation will be available after next General Assembly.

## 3. Awards

### Professor Ceglarek receives NSF CAREER Award



Professor Darek Ceglarek is the 2003 recipient of the US National Science Foundation's Faculty Early Career Development Award. This award comes together with \$ 400.000, which Prof. Ceglarek will use to fund his research on the "Stream-of-Variation Modelling and Analysis for Multi-Station Manufacturing Processes. Modelling Infrastructure for Virtual Assembly".

The NSF Career program recognizes and supports the early career-development activities of those teacher-scholars who are most likely to become the academic leaders of the 21st century. Awardees are selected on the basis of creative career-development plans that effectively integrate research and education.

## Professor Geiger receives ICTP Award



During 7<sup>th</sup> ICTP in Yokohama, which proceeded from October 27<sup>th</sup> to November 1<sup>st</sup>, Prof. Manfred Geiger, Chair of Manufacturing Technology of University of Erlangen-Nuremberg, and Prof. Dr. Kazuyoshi Kondo, Toyota Technical Institute Nagoya were awarded with the Japan Society for Technology of Plasticity (JSTP) International Prize for Research & Development in Precision. This award stands for lifework in the field of forming technology. Prof. Geiger earned this prize in particular for his pioneer work in microforming.

The JSTP-Prize is one of the most important Japanese decorations in the range of manufacturing technology. It is connected with a gold medal, a plaque and a money prize of € 25.000.

Nichidai Corporation, a company of forming tool technology, has sponsored the award. They also promote an international seminar on forming technology for young researchers in May 2003, on which the two laureates will participate with special lectures. Aim of this event is to bring together young forming scientists from Asia, America and Europe with some few leading scientists, including laureates, from all over the world for personal exchange of experience.

## Professor Masuzawa receives high Japanese Award



Professor Masuzawa has received a Commendation by the Japanese Minister of Education, Culture, Sports, Science and Technology for Persons of Scientific and Technological Merits.

There are several categories for the award, established in 1959. The 'Persons of Scientific and Technological Merits' is in the highest rank among them. This award is given to the persons who developed significant, innovative technologies and these technologies have been practically applied and giving merits to the human beings and society, so most receivers of this award are from industries. This year, professor Masuzawa is the only one from a university.

The award has been given for the development of WEDG (wire electrodischarge grinding), which was reported at CIRP GA in 1985 first. After this publication, the WEDG was introduced into commercial micro-EDM machines produced by Matsushita (Panasonic), Toray and Mitsubishi. The machines are used in various fields of applications, for example, production of micronozzles for ink-jet printers, micro tools for printer heads fabrication, magnetic heads for video cameras and spinning nozzles for synthetic fibers. These contributions to the improvement of human life and industrial merit were appreciated

## Mr. Huang receives “Best paper Award”

The CIRP paper written by W. Huang and D.Ceglarek, has received the 2002 Best Paper Award in the international competition of research conducted by Ph.D. candidates. The competition was held in San Jose, California on November 17, 2002 and organized by the Quality, Statistics and Reliability Section of Institute of Operations Research and Management Sciences. (Annals of CIRP Vol. 51/1, pp. 21-26).

# 4. Associate Members News

by John Webster

## General Update

On behalf of the Associate Members (AM), I would like to thank Dr. Norbert Roth for his efforts to help define the role of the industrial members within CIRP, and for providing a voice into the CIRP Council. Most noteworthy was a survey of all CIRP members on the future role of AM's in CIRP, the value of CIRP to AM's, and suggested revised/additional STC topics. Norbert has retired from his position at Siemens, Germany, and therefore has also stepped down from his role as chairman of the AM group. As defined by Associate Member Advisory Group (AMAG) policy, since I am the AMAG secretary I will move into the chairman position. Mr. Juan Minguez, of Ideko Technological Centre, Spain, has accepted the position as secretary of AMAG.

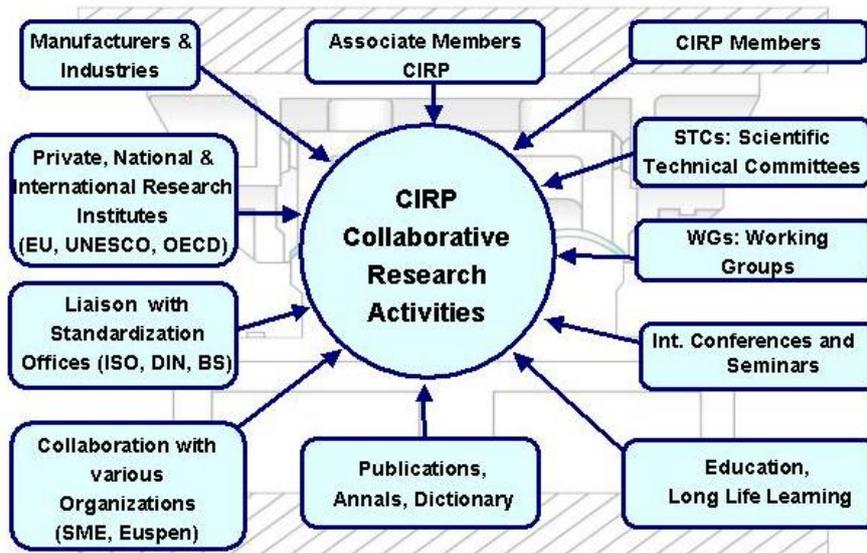
## Associate Member Activities at Montreal General Assembly

The Associate Member activities at the Montreal General Assembly are scheduled for Tuesday August 26th, at the following times:

- 12:00 - 14:00 Associate Member lunch and discussion, at designated tables or room
- 14:00 - 15:30 Associate Member short technical presentations (topics to be advised). Chaired by Prof. R. Wertheim.
- 15:30 - 16:00 Tea/Coffee break
- 16:00 - 17:00 Associate Member Advisory Group meeting (all members welcome) including: mission, organization, reports, seminar reports and recent survey. Chaired by Dr. J. Webster

We are looking for 4-6 AM volunteers to give 10-15 minute technical presentations (especially those that may lead to full papers in the future). The papers should mainly emphasize technical and R and D topics, but products and capabilities are also possible without commercialism. Since many companies are placing restrictions on international travel, we would like to see more presentation offers from North American AM's. Please contact me if you are interested in presenting your work at the AM meeting.

During the AMAG meeting we also encourage Active and Corresponding Members to give updates from CIRP sponsored conferences and seminars run since the 2002 General assembly. Please contact me if you are prepared to give a short update. [John.A.Webster@saint-gobain.com](mailto:John.A.Webster@saint-gobain.com)



The associate members fulfill an important role in the CIRP collaborative network

## 5. From the STC's

### STC "F"

An internet database was developed which determine physical data for the simulation of metal forming processes. This internet portal is called **dasimef**, **data** for the **simulation** of **metal forming** processes. Everyone, who is interested, can register to this contact area and present information on the methods to determine material data. The site consists of a personal and a public part. The public part of *dasimef* is open to everyone who is searching for the needed information, like contact addresses, utilized testing equipment of each laboratory, the tested material, the testing temperatures and the boundary conditions of each measurement. Before the new data is published it is checked by the steering committee .

Address of *dasimef*: <http://www.ibf.rwth-aachen.de/dasimef/>

Steering committee:

Prof. R. Kopp, IBF, Aachen Germany (leading)

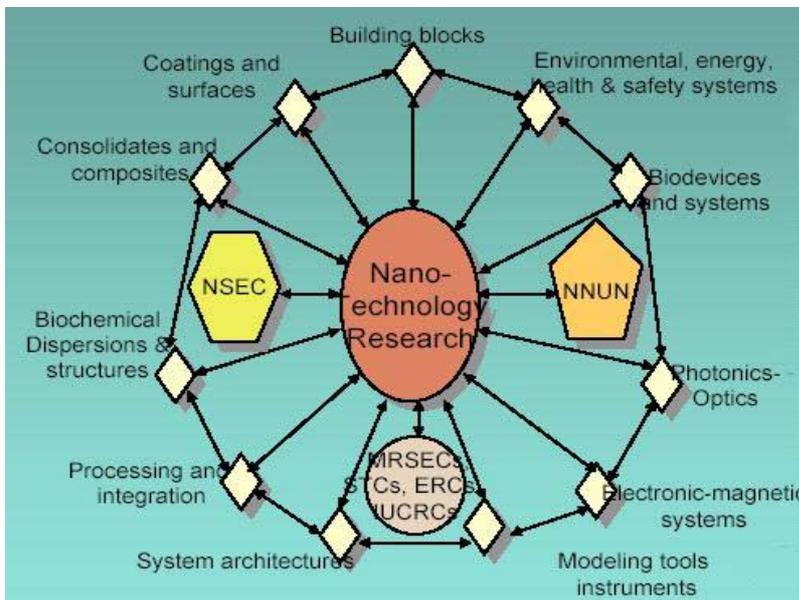
Prof. T. Altan, Ohio State University, Columbus, USA

Prof. P. Bariani, DIMEG, University of Padova, Italy

Prof. M. Geiger, University of Erlangen, Germany

### STC "E"

Prof. H. Doumanidis, program director of the NSF Nanomanufacturing program presented an overview of the current portfolio of the new Nanomanufacturing Program at NSF, with emphasis on non-



traditional nano-machining. The program emphasises scale-up of nanotechnology for high rate production, reliability, robustness, yield, efficiency and cost issues for manufacturing products and services. 3-D nano manufacturing promotes integration of nano structures to functional micro devices and systems, as well as the interfacing issues across dimensional scales. The focus of nano manufacturing is in a systems approach, with nano scale materials and structures, fabrication and integration

processes, production equipment and characterisation instrumentation, theory/modelling/simulation and control tools, learning from nature and biomimetic design, integration of multiscale functional systems, and industrial application. Presentation slides are given in the Appendix (H Doumanidis.pdf) of the STC"E" minutes 2003-E-2.

There are possibilities for collaborative projects in nano manufacturing. NSF can fund US projects, furthermore it is possible to collaborate with separate sources of funding and to develop centre or network of excellence, a framework by national agreement.

## 6. From the labs

### Centre for metal application at Aachen University



On 6th November 2002 with 200 guests from politics, business and science the newly built centre for metal application ZMB (Zentrum Metallische Bauweisen), in Aachen was opened. The centre is an interdisciplinary project uniting skills and knowledge of six institutes of Aachen University, namely metal forming, ferrous metallurgy, automotive engineering, welding, steel construction and materials sciences. These six institutes are attached to the three faculties civil engineering, mechanical engineering and metallurgy. Further information Prof..E.h. R. Kopp: <http://www.zmb-aachen.de>

# 7. Meetings Seminars, conferences

## The 8th CIRP International Seminar on Computer Aided Tolerancing April 28 – 29, 2003, Charlotte, North Carolina, USA,

### Topics

- Tolerance and functionality
- Tolerance specification
- Tolerance analysis
- Task-specific uncertainty in metrology
- Specification and correlation uncertainty in design
- Uncertainty metrics for design and verification
- Tolerance synthesis
- Tolerancing for flexible parts
- Tolerance representation
- Statistical tolerancing
- Assembly modelling and analysis
- Computational metrology, verification
- Geometric quality control
- Tolerancing and life cycle Issues
- Tolerancing standards
- Industrial applications and CAT systems

**Contact:** Prof. Robert Wilhelm Center for Precision Metrology University of North Carolina at Charlotte  
e-mail: [rgwilhel@uncc.edu](mailto:rgwilhel@uncc.edu) website <http://www.mees.uncc.edu/CIRPcat2003/>

## CIRP Design Seminar, Methods and Tools for Co-operative and Integrated Design 12-14 May 2003, Grenoble, France

### Topics:

- Methods for Integrated, Innovative and Collaborative Design
- Methods for Evaluating Design Activity and Progress
- Knowledge Engineering and Collaborative Decision Making
- Co-operation between Designers
- Integration of Multiple Models within a Design Process
- Handling Uncertainty
- Virtual Prototyping, Digital Mock-Ups
- Collaborative Design Tools
- Networking and Distributed Systems for Simultaneous Product and Process Development
- E-Design, E-Manufacturing (Internet-based)
- Product Life-Cycle Modelling, Optimisation and Simulation

- Engineering Design Education and Training
- Industrial Experiences

Contact: prof. S. Tichkiewitch, <mailto:Serge.Tichkiewitch@inpg.fr>  
<http://www.3s.hmg.inpg.fr/ci/dn2003/index.html>

## **6th CIRP International Workshop on Modelling of Machining Operations, 19-20 May 2003, Hamilton, Canada**

This workshop, initiated at the 1998 NAMRC, is the sixth in the series sponsored by CIRP and SME/NAMRI. It is intended to foster an open discussion on the state of development and application of machining models, and to identify promising directions for future research. In particular, a major objective of the workshop is to establish a dialogue between those who apply machining models to production processes/problems and model developers.

The program will comprise three formal sessions devoted to: Applications of Modeling; Recent Advances in the Modeling of Machining Processes; Modeling of Oblique/Orthogonal Cutting.

Contacts: M. A. Elbestawi [elbestaw@mcmaster.ca](mailto:elbestaw@mcmaster.ca) and Y. Altintas [altintas@mech.ubc.ca](mailto:altintas@mech.ubc.ca)

## **CIRP seminar on life cycle engineering 22-23 May 2003, Copenhagen, Denmark**

### **Topics**

- Simplified use of Life Cycle Assessment
- Application oriented LCA
- LCA-education - pre & post graduate
- Life Cycle Management
- Integrated Product Policy
- Design for Environment
- Computer tool café

Contact: Professor Dr. Leo Alting [www.cirpcopenhagen2003.dk](http://www.cirpcopenhagen2003.dk)

## **36th CIRP Manufacturing Systems Seminar 3-5 June 2003, Saarbrücken, German**

### **Topics**

- Digital factory
- Agent-based manufacturing
- Process capability
- Integration of process planning and scheduling for flexible systems
- Web-based design and manufacturing
- Rapid prototyping
- Precision manufacturing
- Flexible fixturing
- Manufacturing software development

- Service support for manufacturing systems
- Environmentally conscious design and manufacturing
- Modelling and simulation
- Expert systems in manufacturing
- Improved manufacturing software development
- Human-machine interfaces
- Socio-technical aspects of automated systems

Contact: prof. H. Bley e-mail: [isms2003@cam.uni-saarland.de](mailto:isms2003@cam.uni-saarland.de)

website: <http://www.cirp-isms2003.uni-saarland.de>

**Second International Working Conference**  
**Total quality management, advanced and intelligent approaches**  
**22-25 June 2003 Subotica, Yugoslavia**

**Topics:**

- TQM & manufacturing management
- World class performances
- Attractive quality
- Robust engineering
- Six sigma model
- Intelligent quality tools and methods
- Virtual factory and virtual quality
- Intelligent metrology in manufacturing
- Intelligent and virtual CMM
- Business process improvement
- Breakthrough management
- Intelligent design for quality

Contact: Prof. Dr. Vidosav D. MAJSTOROVIC, E - mail: [majnem@EUnet.yu](mailto:majnem@EUnet.yu)

Web site: <http://mipk034.maskin.ntnu.no/iwc2002/>

**CIRP 2nd International Conference on Reconfigurable Manufacturing**  
**20-21 August 2003, Ann Arbor, USA,**

**Topics**

- System Configurations – Generation and Impact
- System Scalability for Adaptive Capacity
- Simulation of Modular and Reconfigurable Systems
- Line Balancing in Modular Systems
- Flexible Scheduling
- Reconfigurability and Agility in Semi-Conductor Fabrication
- Reconfigurable Assembly
- Reconfigurable Machining Systems
- Feature-based Process Planning
- Manufacturing for Mass-customization
- Factory Changeability

- Modular Machines
- Reconfigurable Machine Tools and Robots
- Discrete-Event Control, Petri-Net Control, Control Flow-Charts
- Open-Architecture Control Systems
- Sensing for Diagnostics and Rapid Ramp-Up
- Reconfigurable Tooling and Parallel Cutting Tools
- Reconfiguration Cost and Life-Cycle Economic Modeling
- Business models based on RMS

Contact: Professor Y. Koren e-mail: [rms2003@umich.edu](mailto:rms2003@umich.edu) website: [erc.engin.umich.edu](http://erc.engin.umich.edu)

## ICME '03

### 9th International Conference on manufacturing Excellence 13-15 October 2003, Melbourne

ICME '03 is very strongly focused on achieving useful outcomes of original and important research and practice in manufacturing. There will be a separate, but related, stream covering important practical aspects of industry excellence.

Contact: [icme@eelab.cmit.csiro.au](mailto:icme@eelab.cmit.csiro.au) <http://www.preston.cmst.csiro.au/icme/>

## CPI'2003

### 3<sup>rd</sup> International Conference Integrated Design and Production 22-24 October 2003, Meknes, Morocco

This conference follows four other conferences also organized between France and Morocco within the framework of "Integrated Actions". This conference is to propose integrative approaches to production at the conceptual, methodological and technical levels and to promote a dialogue between members of the international scientific community and also with industry

contact: [michel.carrard@iut-cachan.u-psud.fr](mailto:michel.carrard@iut-cachan.u-psud.fr) <http://gmp.iut-cachan.u-psud.fr/cpi2003>

## MDP-8

### eighth Conference on Mechanical Design and Production 4-6 January 2004, Cairo

The conference brings together engineers and scientists from all over the world with a view of exchanging experience and highlighting the state of art in the fields of Mechanical Design and Production. Emphasis is also given to problems related to technology transfer to developing countries especially in Africa and Middle East.

#### TOPICS:

**Design and Tribology:** Methodology, Optimization, Reliability, Maintenance, Fail-Safe Design, Design for Environment, Rapid Prototyping, Geometric Modeling, MEMS Design, Computer Aided Design, Nanotribology, Biotribology.

**Materials and Manufacturing:** Composites, Smart Materials, Crystal Plasticity, Materials Testing and Evaluation, Casting, Welding, Machining, Metal Forming, Nano Technology, Production Automation, Computer Aided Manufacturing.

**Solid Mechanics:** Mechanics of Materials, Constitutive Modeling, Inelastic Behavior, Structural Analysis, Fracture Mechanics, Fatigue and Crack Propagation, Failure Analysis, Finite Element Analysis.

**System Dynamics:** Robotics, Mechatronics, Mechanisms, Control Theory, Fuzzy and Adaptive Control, Smart Structures, Vibration, Acoustics, Machinery Diagnostics.

**Industrial Engineering:** Productivity Measurement and Improvement, Production Management Strategies and Techniques, Facilities and Maintenance Management Quality Management, Human Factors Engineering, Industrial Applications and Case Studies.

Contact: prof. Ehab El-Danaf, e-mail [anaf@mdp](mailto:anaf@mdp) web site: [www.mdp-conf.org](http://www.mdp-conf.org).

## **7th CIRP Workshop on Modelling in Machining & Forming Operations January 2004, Nantes, France**

### **COMA '04**

#### **International Conference on Competitive Manufacturing 4-6 February 2004, Stellenbosch, South Africa**

**Topics:**

Rapid Product Development: Design for Manufacturing and Assembly, Knowledge Management, Reverse Engineering, CAD/CAE, Concurrent Engineering, Rapid Prototyping & Tooling, Virtual Prototyping, HSC & EDM, Process Chains, Non-conventional Processes, Networks in Product Development Agile Manufacturing: Expert Systems in Manufacturing, CAPP/CAM, Machining, Forming, Metrology, Mechatronics, Precision Manufacturing, Robotics, Communication Networks, Reliability, Sensing, Assembly, Automation, Quality Assurance, Intelligent Manufacturing, Software for Manufacturing, Digital Factory Operations management: Factory Planning, Production Planning and Control, Inventory Control, Modelling and Simulation, Scheduling, ERP-applications, Supply Chain Management Enterprise Design and Integration: Product Life Cycle, Human Interface, Web-based Design and Manufacturing, Technology and Innovation Management, Total Quality Management, Distributed Control Systems, Socio-economic and Environmental Issues, Co-operative Value Adding and Enterprise Engineering.

Contact: D Dimitrov e-mail: [coma@eng.sun.ac.za](mailto:coma@eng.sun.ac.za) website: <http://www.ie.sun.ac.za/coma>

## **ISEM 14**

**30 March-4 April 2004, Edinburgh, UK,**

### **Topics;**

- Electro Discharge Machining (EDM)
- Micro Machining
- Laser Beam Machining (LBM)
- Electro Chemical Machining (ECM)
- Electron Beam Machining (EBM)
- Ultra Sonic Machining (USM)
- Water Jet Machining (WJM)
- Other Electrical Machining (AJM, AFM, IBM, CHM. . .)
- Rapid Prototyping
- Environmental, Safety and Legal Aspects.

Contact: J.A. McGeough e-mail: [lisa.ellis@ed.ac.uk](mailto:lisa.ellis@ed.ac.uk) web site: [www.lifelong.ed.ac.uk](http://www.lifelong.ed.ac.uk)

## **37th CIRP Manufacturing Systems Seminar digital factories, production networks,**

**19-21 May 2004, Budapest, Hungary**

## **2004 CIRP Design Seminar " Design in the Global Village"**

**1-3 June 2004, Cairo, Egypt**

Contact: W.ElMaraghy, A.B. Khairy

## **11th International CIRP Life Cycle Seminar**

**Life cycle product – Quality management issues**

**20-22 June 2004, Belgrade, Serbia**

The management of sustainable development considered from the aspect of product's life cycle and its quality management represents a real challenge for researchers, economy and educational system. The aim of this Seminar is to acquaint the home public and experts with the achievements and trends in the world in this field. This will later serve as a basis for building of national strategy in this respect. The main objective of the Seminar is to provide an international forum for the exchange of knowledge, experience, research results and information about various aspects of LCP in context QM.

Topics are Quality Management Issues on different stages of Life Cycle Product (Engineering, Design (Eco-Design), Assessment, Management, Disassembly), in the context of sustainable development and manufacture: Research, Applications Education

Contact Prof. V. D. Majstorovic. e-mail: [majnem@EUnet.yu](mailto:majnem@EUnet.yu) [www.lcs04.mas.bg.ac.yu](http://www.lcs04.mas.bg.ac.yu)

## **7th International Conference on Monitoring and Automatic Supervision in Manufacturing, AC'04**

**19–21 August 2004, Zakopane Poland**

### **Topics:**

- Introduction: general situation of automatic control in monitoring with the stress on automatic monitoring and supervision, nomenclature, classification.
- Sensors and basic processing of signals for monitoring in manufacturing.
- Strategy and algorithms of the design systems for the monitoring and supervision of manufacturing processes, accidents and breakdowns, product quality, machines and manufacturing equipment.
- Monitoring and supervision in a multi-stand manufacturing system as a whole.
- Monitoring and supervision through network and/or the Internet.
- Monitoring and supervision in manufacturing processes: Turning, Milling, Drilling, Abrasive machining, EDM, ECM and Assembly

Contact: M. Szafarczyk, [mzybura@ios.krakow.pl](mailto:mzybura@ios.krakow.pl)

## **CIRP Design seminar New Innovation in engineering design**

**Shanghai, China, June 2005**

Contact: S. Lu

## 8. Paris, January 2003



The January meetings in the Maison Nicolas Barre center have been a great success. The members appreciated the place very much.

In the mean time is decided that the next January meetings will also be held here.

### CIRPnet news

The CIRP Member Area has been extended by:

- The Annals 2002, Vol.1 & 2.
- The "2002 Internal Documents and Reports" from last General Assembly, also available directly through the button "Publications".
- The 2003 Directory of the CIRP Members.
- Statistics on the number of visits of our website.

The scanning of the 10 previous years (1991-2000) of the Annals, Vol.1 & 2, is in progress supervised by Serge Tichkiewitch in Grenoble, France.

A new Research Engine has been settled and is now working, although it is still improving.

The Annals 2001 and 2002 will be added very soon to this Research Engine.

A new page has been created through the button "STC News", giving information on the STC's and the Working-Groups, with access to the Agendas and the Minutes (with password).

The "Secretariat Information" page has been modified so that Nomination Forms and Registration Forms can now be downloaded directly from that page (but still with the password).

## 9. Miscellaneous

### Received:

**Passive Vibration Isolation** by Eugene I. Rivin. This book provides a comprehensive treatment of design principles and the means for realization of passive vibration isolation systems for real-life objects. Prof. Rivin describes the basic analytical tools for designing such systems; principles and criteria for assigning principal parameters (natural frequencies and damping values) necessary for successful functioning of passive vibration isolation systems for major groups of objects (vibration-sensitive objects, vibration-generating objects, general-purpose machinery); static and dynamic characteristics of the most widely used materials for vibration isolators; and basic designs of vibration isolators for various applications. Special emphasis is given to effective techniques and methods that are not yet widely used in the practice of vibration isolation.

### Job opportunity:

The Faculty of Mechanical Engineering at the Eindhoven University of Technology (TU/e) searches for candidates for a **Full Chair on Micro- and Nano-Scale Engineering**

Over the past decade the Faculty has been restructured to a far-reaching extent. Results are nowadays easily recognized: Education and Research in modern mechanical engineering obtained a new focus and identity; moreover interactions with high-quality, high added value, manufacturing industry were strengthened. The Mechanical Engineering Faculty embraces about 650 engineering students and 250 staff members and ten full chairs.

Information: Prof. P.Schellekens e-mail: [p.h.j.schellekens@tue.nl](mailto:p.h.j.schellekens@tue.nl) website: <http://pe.wtb.tue.nl>