



CAD/CAM

NEWSLETTER

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Information Compiled by the CAD/CAM Technology Advancement Council*

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1. Office Automation Demonstration Projects

On March 27, 1985 a one day seminar was held in Ottawa for approximately two hundred invited attendees to hear reports and presentations on five office automation projects which have been sponsored by the federal Department of Communications. Briefly stated, the program of office communications systems field trials took place over the 1980 - 1985 time frame under DOC sponsorship with approximately \$13 million in funding. Five systems suppliers each provided a system of their design which was installed in a government department on a field trial basis. At the seminar, marking the termination of the field trial program, each user and each supplier presented their views on system design, performance and experience.

Readers of the CAD/CAM Newsletter will be able to draw useful information from the following observations, as given by many of the speakers, since they could in many instances apply to CAD/CAM systems as well as office automation systems, although with differences in some cases.

The systems described had mostly been installed for a reasonable trial and evaluation period. Several involved the installation of a trial system of a hundred or more terminals with installation spread over two cities in

some cases, use of a shared data base or common resource in the application and extensive office communication (such as electronic mail or shared data). Some involved the integrated handling of information in voice, text and data form.

The suppliers were uniformly pleased and highly complimentary of the program which not only fostered new development, but also provided a test bed for systems evaluation in a working environment. New, proven systems of Canadian origin, with a demonstrated record of performance and acceptance, have resulted from the program, which can now be offered in both domestic and international markets.

- Users have gained in experience and expressed satisfaction with the results.
- The prototype systems are in regular use. Users would be reluctant to give them up.
- Savings are reported in increased productivity, time saved, higher quality work, better availability of information, improved communication and similar factors.
- It is difficult to document savings in economic terms in spite of a concerted effort to do so because of the nature of the changes involved. Full evaluation, which is planned, includes system performance, user acceptance, human/social factors, organizational impacts and productivity.
- For success start small and grow later.
- User involvement in system design is essential from the beginning.
- Experienced users are no longer patient with novice systems.
- There is a place for both menu based and function key oriented systems.
- It is important to estimate and plan training requirements. Training is done best with a hands-on, on-the-job approach. Provision should be made for training new personnel. This can run as high as 30% due to moves and staff turn-over.
- Experience tended to show a greater need for inter-connection to existing equipment than was anticipated.
- Inter-connection and integration are vital areas in which international standards, (both formal and defacto) will be the key.
- No mention was made of the inter-connection between office automation and factory automation systems (CAD/CAM). This is understandable, recognizing the nature of the test sites which did not have related manufacturing operations.

2. CAD/CAM News Items

- "Robot Market Shows 50% Growth"

Statistics from the Robot Industries Association (RIA) show that the market for U.S. based robot suppliers grew at about a 50% rate in 1984.

A total of 3,060 robots were shipped in 1983, with another 2,297 robots shipped in the first half of 1984. The RIA estimates that some 13,000 robots are installed in the U.S.A.

Shipments by U.S. based robot suppliers have increased from 3,060 units valued at \$194.4 million in 1983 to 1,232 units valued at \$81.5 million for the first quarter 1984 and 1,065 units valued at \$66.5 million for the second quarter 1984. Total figures for 1984 based on first and second quarter shipments and unfilled orders for the balance of 1984 are 1,654 units valued at \$142.3 million. The average cost of robots, based on new orders, has decreased from \$74,100 in 1983 to \$59,300 in the 1Q84 and \$59,100 in the 2Q84. (Source: Manufacturing Productivity Frontiers, March 1985.)

- "ICAM Program Increases Technology Transfer Activities"

The United States Air Force is increasing its technology transfer activities on advanced manufacturing technology, for example, via the Computer Integrated Manufacturing "Industry Days" hosted in Dallas in April. Many projects sponsored through the Industrial Modernization Incentives Program (IMIP) are being described and three university centers will give special seminars in 1985. For presentation of some further details see the "Flexible Automation Newsletter", February 1985.

- "The International FMS Club"

An "International FMS Club" has been established and is managed by IFS, already known for its subsidiaries IFS Publications, IFS Conferences the FMS Magazine and as managers of the British Robot Association since 1977. Annual membership subscription is £650 for companies and £325 for some others such as academic institutions, trade unions and governments. Members will receive a number of IFS publications, one place at the Annual FMS Conference plus preferential rates for fact finding missions. A study tour to Japan is planned based on the FMS and Robot Show to be held in Nagoya, November 1985.

Contact: The International FMS Club
35-39 High Street
Kempston, Bedford MK42 7BT
England
Telephone: (0234) 853605
Telex: 825489

- "CAM-I Moving to Major Expansion of Activity"

The CAM-I Newsletter for March 1985 provides further information on approvals leading to changes in its membership structure and the launching of new major projects such as the IMPACT project, (Integrated Machine Planning and Control Technology). Further description of the changes being implemented at CAM-I are contained in an article in Canadian Machinery and Metalworking, (pages 36-37, 42) January 1985. Basically, in addition to the smaller projects funded by CAM-I in the past (which are now called programs), a new series of major projects with much higher funding levels, and some government funding, are being added. The IMPACT project has a planned budget of \$18-23 million over four years. The objective of this project is to develop the capability to automatically generate process plans and NC programs starting with a solid model of the product and a minimum of human assist. The system will use technologies of feature recognition, expert system planning and advanced NC machine tool control.

- "Manufacturing Automation Protocol (MAP)"

Events related to development of the Manufacturing Automation Protocol (MAP), initiated by General Motors, are happening almost too fast to permit documentation and reporting. To keep up watch for articles and news notes about MAP in the technical and trade journals. It is reported that approximately four hundred persons attended the MAP users meeting in January 1985 in the U.S.A. but with only a very small number of Canadians attending (approximately four). Efforts are being made to focus Canadian attention prior to the MAP Users Group Meeting scheduled for April 28-30 in Dallas, Texas. Briefly stated, MAP is a seven-layer, broadband, token-bus communications standard for interconnecting computers, robots, NC machine tools and other automation equipment.

The MAP development and standardization efforts were initiated by General Motors who have identified a vital need to interconnect their "islands of automation". General Motors have identified approximately 40,000 intelligent devices currently installed in manufacturing areas with a projected 400-500% increase to 200,000 intelligent devices expected by 1990. The need for standardization to facilitate ready interconnection, reduce wiring costs and enable the next round of productivity improvement in computer integrated manufacturing is highly evident. Information concerning MAP and the MAP Users Group meetings may be obtained from the Society of Manufacturing Engineers (313) 271-1500 extension 521.

3. CAD/CAM and Robotics in Film and Video Tape Form

As indicated in the March Newsletter, which featured a comprehensive listing of books on CAD/CAM and Robotics technology, this April issue includes a listing of instructional and informative presentations on CAD/CAM and Robotics which are in film or videotape form.

Not everyone has the opportunity, and not everyone can afford the time and expense, to attend many of the major CAD/CAM conferences or to visit and tour the major installations. Accordingly, as the number of people involved with CAD/CAM technology and installations increases, it is expected that information in film and video tape form will be used increasingly by senior executives, technical managers, technical support personnel and direct workers.

Undoubtedly the brief listing which follows is far from complete. The editor of the CAD/CAM Newsletter would be pleased to hear from readers who wish to recommend additional source material that is openly available.

In addition to the contacts listed below, interested readers may wish to contact one or more of the CAD/CAM Centres in Canada since they may already have copies of the video tapes or films in a number of instances.

- "1984-85 SME Video Tape Catalog"

A new catalog of video tapes available from the Society of Manufacturing Engineers. Titles of those available in the automated manufacturing series include the following plus six others. Other tapes are available in the traditional manufacturing series, manufacturing management series and training series.

<u>Title</u>	<u>Produced by:</u>
Introduction to Industrial Robots	RIA
Industrial Robot Applications	RIA
Robot Safety at Caterpillar	Caterpillar Tractor Company
Modern Manufacturing Systems	CASA/SME

The majority of tapes run 20-35 minutes in length, are available in most video tape formats, and are available for rental as well as purchase.

Contact: Video Communications Department,
Society of Manufacturing Engineers,
One SME Drive, P.O. Box 930,
Dearborn, Michigan 48121, U.S.A.

- SME Video Magazine Now Available

The Society of Manufacturing Engineers now has a video magazine "Manufacturing Insights" available on a regular subscription basis. Each issue is a 35 minute video tape featuring a close-up study of four or five installations utilizing the methods and equipment under study. The video tape format is designed for convenient viewing by management teams without costly and time-consuming travel. Questions are answered as if the viewers themselves were present on the shop floor.

The first issue is now available and addresses FMS, while the second issue will examine robotic assembly and packaging. Future issues, to be issued quarterly, will include adaptive control, robotic welding/painting, simulation and other topics.

Subscription price is \$450 (U.S.) per year and \$500 (U.S.) for non-members, starting in 1985. Trial subscriptions, which include the first two issues only, are \$225 (U.S.) and \$250 (U.S.) respectively.

Contact: Steve Bollinger
SME Headquarters
One SME Drive, P.O. Box 930
Dearborn, Michigan 48121, U.S.A.
Telephone: (313) 271-1500 ext. 402

- SME Conference and Tutorial Video Tapes

Three video tapes presenting current information on CAD/CAM and robotics technology were shown at a special film session during the 3rd Canadian CAD/CAM and Robotics conference in June 1984. Each is available from the Society of Manufacturing Engineers and is approximately 25-27 minutes in length. Additional material is described in the "1984-85 SME Video Tape Catalog" available on request (see above). A similar video tape and film night is scheduled for Wednesday evening, June 19 as part of the 1985 conference. Material presented in 1984 included:

"Robots 7" - The evolution in automation, presents a review of products and developments from the Robots 7 exhibition held in Chicago, April 1983. The offerings and product features of more than twenty commercial suppliers are briefly presented.

"AUTOFACT 5" - A similar filmed tour of some 177 exhibits on display during the AUTOFACT conference in 1983 which emphasized computer integrated manufacturing.

"Machine Vision Technology" - A tutorial presentation on machine vision technology ranging from Vidicon camera approaches to high resolution CCD (charge coupled device) cameras with 256 x 256 pixel array capability. More than 50 companies are reported to be active as machine vision suppliers, with 700 reported installations in 1983 and 50,000 estimated by 1993.

Contact: Society of Manufacturing Engineers
One SME Drive
P.O. Box 930
Dearborn, Michigan 48121, U.S.A.
Telephone: (313) 271-1500

- "Adaptable Programmable Assembly System (APAS)"

A 15 minute colour and sound film or video tape describing the APAS project, a system developed by Westinghouse Electric Corporation as an

important first step in integrating robotics in a flexible manufacturing system. The APAS project, considered a milestone in advanced manufacturing, was developed over five years by Westinghouse with partial funding from the National Science Foundation (NSF). The APAS project demonstrates the assembly of end bells of a fractional motor with a wide variety of part and production changes. Available in 16 mm film (\$275 U.S.), 3/4" U-Matic video tape (\$250 U.S.) or 1/2" VHS video tape (\$250 U.S.) plus \$4 (U.S.) shipping and handling in each case. Video tape units may also be rented (\$75 U.S.) with a 30 day purchase option.

Contact: Video Communications Dept.
Robotics International of SME
One SME Drive
Dearborn, Michigan 48121, U.S.A.

- Industrial Robot Video Tape Series

An instructional video tape series on industrial robots was introduced at Robots 8 by GMI Engineering and Management Institute (Flint, MI). The four video tapes in the series include: Fundamentals and Terminology (54 min.), Safety Considerations (37 min.), Applications in a Manufacturing Environment (30 min.), and Evaluation and Implementation (52 min.).

Contact: GMI Continuing Education Dept.
1700 W. Third Avenue
Flint, Michigan 48502-2276, U.S.A.
Telephone: (313) 762-9866

- "A Ford Guide to CAD/CAM"

A twenty minute educational film describing commitment to CAD/CAM by Ford in automotive manufacturing from initial design to final product including the use of accurate, reliable, shared data by engineers at Ford locations in Britain, Germany and the U.S.A. Available in both 16 mm and video formats.

Contact: Guild Sound and Vision Library
Guild House
Oundle Road
Peterborough, U.K., PE2 9PZ

- "Computers in Your Life"

A look into the basics of computer technology presented in a lighthearted but informative manner by respected experts from major universities and research centres in the U.S.A. Humorous scenarios are used to illustrate that "computer errors" are often, in fact, human errors. Thirteen minutes. Sound plus colour. Available in 16 mm, 3/4" or 1/2" VHS video tape format. 16 mm (\$150 U.S.), 3/4" video tape (\$75 U.S.) or 1/2" VHS (\$50 U.S.).

Contact: Order Department
Association for Computing Machinery (ACM)
P.O. Box 64145
Baltimore, Maryland 21264, U.S.A.
Telephone: 1-800-526-0359 ext. 75

- "SIGGRAPH Video Review"

Although devoted to state-of-the-art presentations in computer graphics rather than CAD/CAM per se, this material will be of interest because of the striking nature of the presentations and the fact that eventually many of the capabilities shown will eventually be available in commercial CAD systems.

The series is described by the ACM as "the world's only multi-issue computer graphics publication on video tape". One-hour-long video tapes illustrate concepts in both computer graphics and interactive techniques. Reviewed and edited along with outstanding motion graphics examples, the tapes currently comprise 17 hours of individual programs, primarily in full color, with the latest four issues emerging from SIGGRAPH '84. The tapes provide an unequalled opportunity to study advanced computer graphics ideas and applications. International distribution, at the rate of nearly 2,000 per year, extends their enormous impact abroad; the impact of VR may be noted favorably in the quality of computer graphics communications and educational applications.

Tape formats: 3/4" U-matic and VHS. (Beta and 1/2" reel-to-reel are not available.)

- 3/4": one hour each, one issue per tape: 17 issues.

ACM/SIGGRAPH Members: \$50.00 (U.S.). Others: \$60.00 (U.S.).

Order No. 915840

- VHS: two hours each, two issues per tape (except #7): 17 issues.

Issues 1&2, 3&4, 5&6,7, 8&9, 10&11, 12&13, 14&15, 16&17. ACM/SIGGRAPH

Members: \$50.00 (U.S.). Others: \$60.00 (U.S.) [except #7 which is \$10 (U.S.) less.]

Contact: Order Dept.

Association for Computing Machinery (ACM)

(as above)

- Video Tapes and Films from Equipment Suppliers

Many equipment suppliers, particularly those supplying either industrial robots or flexible manufacturing systems, have video tapes available of their products in action. For example, video tapes of the

Yamazaki flexible manufacturing system in Japan have been available from the Canadian agent CAE Morse, or video tapes of the Mori Seiki flexible manufacturing system have been available from Gross Machinery in Toronto. The new edition of "Companies and Organizations Providing CAD/CAM Products and Services in Canada", to be available from the federal Department of Regional Industrial Expansion (DRIE) about June 1985 may be consulted for a complete list of equipment suppliers who might be contacted for video tape or film material.

- "The Microelectronics Revolution: Ready or Not"

Presents a review of industrial automation examples, all stemming from advances in microelectronics. Examples presented include plant monitoring by remote control, automated assembly of electronic products and numerical control of machine tools. The increasing pace of change is noted along with a need for advance notice of technological change via the collective bargaining process. Approximately thirty one minutes, colour.

Contact: Labour Education and Studies Centre
Canadian Labour Congress
2841 Riverside Dr.
Ottawa, Ontario, K1V 8N4
Telephone: (613) 521-3400

- "IEEE Video Tape Course on Robotics"

For information concerning the IEEE Video tape course on Robotics, originally broadcast via satellite and subsequently made available as a video tape course of approximately one day duration, the Canadian region 7 office of the IEEE may be contacted. Titles available include Robotics I (3/4" Betamax, short course), Robotics II (1/2" VHS, short course), Project Management (1/2" VHS, short course) and Integrated Manufacturing Systems (1/2" VHS, short course).

Contact: IEEE Region 7 Office
7061 Yonge St.
Thornhill, Ontario, L3T 2A6
Telephone: (416) 881-1930

4. CAD/CAM Information Available

In addition to the regular monthly issues of the CAD/CAM Newsletter, the following five "companion" publications have been prepared by the Department of Regional Industrial Expansion (DRIE) and the National Research Council of Canada (NRC) to facilitate the development and application of advanced manufacturing technology systems in Canada.

- "Selected Articles on Advanced Manufacturing Technologies - Reprint #3"

A reprint of CAD/CAM articles, selected by the editor of the CAD/CAM Newsletter and other members of the CAD/CAM Technology Advancement Council, is available on request from the Department of Regional Industrial Expansion (DRIE). This third issue updates and replaces the previous reprints of 1977 and 1981 which were available from the Department of Industry, Trade & Commerce (DITC).

Twenty eight articles, chosen from many journals and conference publications, are included which cover:

- General introductions to CAD/CAM
- Computer Aided Design and Drafting (CADD)
- Computer Aided Engineering, Group Technology, Computer Aided Process Planning and Database Design
- Numerical Control
- Industrial Robots
- Flexible Manufacturing Systems
- Industry Applications
- Data Transfer and Control Standards

Contact: Technology Assessment Directorate
Office of Industrial Innovation
Department of Regional Industrial Expansion
235 Queen Street
Ottawa, Ontario, K1A 0H5
Telephone: (613) 995-3741

- "Towards the Factory of the Future. An Index and Guide to CAD/CAM Technology", J. Scrimgeour, NRC Publication 24261.

Using INSPEC Computer and Control Abstracts as the information source, literature references and abstracts dealing with technology, management and policy issues concerning the factory of the future are presented for the time period 1979-1984. Approximately 1300 references are represented which have previously appeared in the CAD/CAM Newsletter.

References are structured according to subject areas such as Computer Aided Design, Production Control, Numerical Control, Automated Testing, Robotics, Distributed Systems, Systems Design, Flexible Manufacturing Systems, Social Implications, Industry Application Areas and Major National Programs.

Additional observations and comments are provided on the content and use of this information from a utility and technology transfer point of view.

Unlike many books or reports, it is not necessary to read this particular publication from the beginning. It can be used as a tutorial or as a reference, to study or to browse, starting on almost any page.

Anta Dendrey

What is "CAD/CAM Technology", or what will "The Factory of the Future" really be like? In a sense no one really knows since these topics tend to defy definition, if not description.

The report represents the work of well over one thousand authors rather than the work of any one person. Although it probably presents the most complete compilation assembled anywhere to date, there is almost no duplication amongst the contributions. Each author represented tends to have a different background, a different starting point, a different point of view, and hence something different to contribute.

It is hoped that the report will be useful in many different ways. Copies are available from NRC on request.

Contact: Institute for Manufacturing Technology (IMT), Ottawa
Building M-16
National Research Council of Canada
Montreal Road
Ottawa, Ontario, K1A 0R6
Telephone: (613) 993-9000

- "Reference Guide to CAD/CAM and Robotics Centres"

A "Reference Guide to CAD/CAM and Robotics Centres" is in preparation and is planned to be available in publication form from the National Research Council about May 1985. The publication will provide an index and guide for managers and technical personnel in industry to approximately seventy CAD/CAM and Robotics development and information centres in Canada, and to some similar centres in the U.S.A. on a selected basis. The publication will also be useful for the coordination of activities between the various centres in Canada. The Canadian centres, mostly established for regional delivery of information on CAD/CAM technology, including robotics, have both similarities and differences in their abilities and approach.

Contact: M. Zevy
Room 269-P, Building M-55
National Research Council of Canada
Montreal Road
Ottawa, Ontario, K1A 0R6
Telephone: (613) 993-1753

- "CAD/CAM Products and Services in Canada"

A directory is available to companies and organizations providing CAD/CAM products and services in Canada based on information compiled in 1981, 50 pp. Available in French or English. No charge. An updated and expanded edition is in preparation and planned to be available mid-1985.

Contact: Office of Industrial Innovation (5C)
Department of Regional Industrial Expansion
235 Queen Street
Ottawa, Ontario, K1A 0H5
Telephone: (613) 995-3741

- "An Index and Guide to Robotics Research & Development in Canada"

Recognizing the potential for the application of robotics technology in a wide range of functions and services, robotics research and development projects have been formulated and are proceeding at a number of locations in Canada particularly in universities and government laboratories.

Accordingly a need has been identified to develop a guide to robotics research and development in Canada as a readily available document or report. The report is expected to be useful in the following ways:

- * Date **
** July **
- The report will be of value to researchers in universities, government laboratories, industry and elsewhere in planning their ongoing work and in using to maximum advantage the work of others.
 - Canada is one of a number of countries participating in the Joint Coordinating Forum on International Cooperation in Advanced Robotics. The main purpose of this forum is to facilitate, through international cooperation, the development of advanced robotic systems for applications which will reduce the necessity for people to work in harsh, difficult or dangerous environments. Accordingly, the guide to robotics research and development in Canada will be useful in informing officials and researchers in other participating countries of the interest and capability which exist in Canada and in arranging, where appropriate, Canadian participation in the joint projects which are currently in the planning stage.
 - The report will be a useful reference and guide to managers and technical personnel in industry who have a need to know where robotics R&D is being undertaken in Canada plus the nature and level of the work.

The report, prepared for NRC by robotics researchers and specialists at the University of Toronto and the Ontario Robotics Centre, will be available in English or French as an NRC publication in June 1985.

Contact: Editorial Office
Division of Electrical Engineering
Building M-50
National Research Council of Canada
Ottawa, Ontario, K1A 0R8
Telephone: (613) 993-1880

- Proceedings Available for 1985 Tucson Conference

Proceedings are available for the 1985 conference of the CAD/CAM, Robotics and Automation Institute held at the University of Arizona,

Tucson Arizona, February 11-15, 1985. (See CAD/CAM Newsletter, September 1984.) Conference proceedings are \$100 (U.S.) and Supplemental Institute Notes \$75 (U.S.). Description of intelligent robot assembly systems developed by IBM are included as one example.

Contact: E. Sandgren
2008 Engineering Building
University of Missouri
Columbus, MO 65211
Telephone: (314) 882-3830

- "Artificial Intelligence Applications for Manufacturing" R.K. Miller, book, SEAI Technical Publications (1984).

The following chapters are included in addition to seven initial chapters oriented to an introductory and general view of artificial intelligence and expert systems.

- Expert Systems in Manufacturing: An Overview
- Application of XCON (R1) at Digital
- The CMU Factory Monitoring System
- Expert Systems for Quality Control
- Expert Systems for Robotics
- Expert Systems for CAD/CAM
- Expert Systems for Maintenance
- Expert Systems for Process Control
- Expert Systems for Simulation
- Speech Recognition

Information courtesy "Manufacturing Productivity Frontiers", March 1985.

Contact: SEAI Technical Publications
P.O. Box 590
Madison, CA 30650, U.S.A.
Telephone: (404) 342-9638

5. CAD/CAM Conferences, Exhibitions, Workshops and Seminars

- "The Practical Application of CAD/CAM Technology"
May 28-29, 1985, Ontario CAD/CAM Centre, Cambridge, Ontario.

A two day seminar which follows the evolution of a commercial product from design through to manufacture. On day one, design data is developed using various computer based tools. The second day covers the utilization of this data for the manufacture of component parts, in a sequential step by step manner.

Contact: Ontario CAD/CAM Centre
400 Collier-MacMillan Drive
Cambridge, Ontario
N1R 7H7
Telephone: (519) 622-3100

- "Canadian CAD/CAM and Robotics Exhibition and Conference"
June 18-20, 1985, Skyline Hotel and International Centre, Toronto.

This annual conference and exhibition will feature presentation of more than fifty technical papers in a three parallel session format, plus keynote speakers and luncheon speakers each day. Attendance will be limited to the first 1000 registrants. Close to 80 exhibitors have already been booked for the exhibits section which typically attracts approximately six thousand persons over the conference period. The conference will include a special film and video session Wednesday evening, June 19 open to all participants.

Technical sessions are included throughout the conference on Robotics Research, CAD/CAM Applications, Management and Justification, Computer Integrated Manufacturing and other topics. A special session on CAD/CAM Education will be organized and presented by the Ontario CAD/CAM Educators, Thursday, June 20.

	<u>Payment</u> <u>before June 11</u>	<u>Payment</u> <u>after June 11</u>
Full conference	\$300*	\$350
Single day registration	\$150*	\$175
Student registration	\$ 35	\$ 50

* Members of the Canadian Institute of Metalworking or the Canadian Manufacturers' Association will receive a 20% reduction if received by June 11.

Contact: Canadian Institute of Metalworking
1276 Sandhill Drive
P.O. Box 7317
Ancaster, Ontario
L9G 3N6
Telephone: (416) 648-5011

- "Successful Implementation of Computer Integrated Manufacturing (CIM)"
June 18-20, 1985, Constellation Hotel, Toronto.

A three day educational clinic sponsored by the Computer and Automated Systems Association of SME. Presentations in the clinic will address topics such as, Components of CIM, Methods of Integration, Planning and Managing for CIM and others. Speakers are expected from IBM, Motorola, General Electric, ITT, Ontario CAD/CAM Centre, US Air Force ICAM and others. Fee \$425 (U.S.) for members of SME, \$495 (U.S.) for non-members.

Information from SME indicates that payment of this fee also permits attendance at the Canadian CAD/CAM Conference and Exhibition as described above plus a year free membership in SME.

Contact: CASA/SME
One SME Drive, P.O. Box 930
Dearborn, Michigan 48121, U.S.A.
Telephone: (313) 271-0039 (before 4:30 p.m. EST)

- "Computer Aided Design in Control and Engineering Systems - (CADCE '85)
July 31 - Aug. 2, Technical University of Denmark, Lyngby, Copenhagen,
Denmark.

The 3rd IFAC/IFIP International Symposium "CADCE '85" will present approximately 100 technical papers in fifteen technical sessions and four plenary sessions. Virtually all papers are devoted to the Computer Aided Design of Control Systems or CAD related to control systems education. Many design software packages will be described for both linear and non-linear systems design, single variable and multi variable systems plus applications in electric power plants, power systems and process control. The language of the symposium is English with subsequent publication of the proceedings by Pergamon Press Ltd., the official IFAC publisher.

Contact: 3rd IFAC/IFIP Symposium on CADCE 1985
Danish Automation Society
Building 229
Technical University of Denmark
DK-2800 Lyngby
Denmark
Telephone: 45 *2 87 40 00
Telex: 37529 DTH DIA DK

- "1985 Carnahan Conference on Harmonizing Technology with Society"
August 22-23, 1985, University of Kentucky, Lexington, Kentucky.

The premise of the conference is that robotics, automation and artificial intelligence will soon be capable of destroying the foundation of our work based society. The purpose of the conference is to address the resulting crisis in ethics and values and to discuss the future organization of society.

Call for papers requests 200 word typed abstract listing title, author(s), affiliation, address and phone number prior to May 15, 1985.

Mail abstracts to:

For Additional Information contact:

Cheryl Banks, Conference Coordinator
Office of Continuing Education
223 Transportation Research Bldg.
University of Kentucky
Lexington, KY 40506-0043
U.S.A.
Telephone: (606) 257-3974
Telex #: 5104768816

John Jackson, Conference Director
Dept. of Electrical Engineering
565 Anderson Hall
University of Kentucky
Lexington, KY 40506-0046
U.S.A.
Telephone: (606) 257-3926
Telex #: 5104768816

- "COMPINT '85 - Computer Aided Technologies"
Sept. 9-12, 1985, Palais des Congrès, Montréal, Québec.

Sponsored by the IEEE, (Montreal Section), IEEE Computer Society and the Association for Computing Machinery, the call for papers has indicated that the conference includes the following areas of interest:

- Robotics
- Computer Aided Manufacturing
- Computer Aided Design
- Computer Aided Industrial Operations
- Advanced Software for Industrial Systems
- Man Machine Interfaces
- Computer Assisted Education
- Computer Communications
- Computer Graphics
- Computer Aided Decision Making

Further information indicates that the conference will include a special session on new generation computers. Experts from world renowned projects such as ESPRIT (Europe), ALVEY (U.K.), DARPA (U.S.A.), and Japan's Institute for New Generation Computer Technology (ICOT) will describe their projects. Dr. E. Manning from the University of Waterloo will describe the proposed \$27 million Canadian 5th Generation Research Plan.

Contact: Stephen G. Leahey
COMPINT '85
P.O. Box 577
Desjardins Postal Station
Montreal, P.Q., Canada
H5B 1B7
Telephone: (514) 870-2969

- "1985 World Congress on the Human Aspects of Automation"
Sept. 9-12, 1985, Cambridge Hyatt Regency, Boston Mass.

The third annual Human Aspects of Automation Congress will bring together human factor and ergonomic experts with business and manufacturing professionals all seeking to investigate, improve, and innovate the transitional phases of technological change.

Presentations will include case studies by a wide variety of professionals involved in the human aspect area, such as:

- Strategic planners
- Training and development specialists
- Work life experts
- Office automation specialists
- Human resource specialists
- Safety & health specialists
- Industrial relations professionals

- Labor leaders
- Social scientists and educators
- Architects and planners
- Organizational consultants

Contact: Argenia C. Ford
Technical Activities Department
Society of Manufacturing Engineers
One SME Drive
P.O. Box 930
Dearborn, MI 48121, U.S.A.
TWX: 810-221-1232 SME DBRN

- Robots East Show*

Oct. 9-11, Boston, MA.

Contact: Robotic Industries Association
313-271-7800

- American Productivity Management Association Meeting*

Oct. 9-11, Toronto, Canada.

Contact: 312-677-9141

- Automated Guided Vehicle Systems*

Oct. 15-17, Stockholm, Sweden, U.K.

Contact: IFS (conferences) Ltd.
35-39 High Street
Kempston, Bedford MK42 7BT
U.K.
Phone (0234) 853605 or
Telex #: 825489

- Flexible Manufacturing Systems Conference*

Oct. 15-17, Stockholm, Sweden, U.K.

Contact: IFS (conferences) Ltd. (as above)

- Robot Vision and Sensory Controls*

Oct. 29-31, Amsterdam, The Netherlands, U.K.

Contact: IFS (conferences) Ltd. (as above)

- Sensors for Untended Manufacturing Conference and Exhibits (Sensors '85)*

Nov. 4-7, Detroit, MI.

Contact: Computer and Automated Systems Association of SME
313-271-1500 (ext. 371)

- Autofact Conference and Exposition*
Nov. 4-7, Detroit, MI.

Contact: Computer and Automated Systems Association of SME
313-271-0777

* Information for the above seven items has been obtained from
"Manufacturing Productivity Frontiers" a monthly publication of the
Manufacturing Productivity Center, IIT Center, Chicago, Illinois.

- "IEEE International Conference on Computer Aided Design (ICCAD-85)"
Nov. 11-14, 1985, Santa Clara, California.

ICCAD-85, the annual IEEE conference for Electrical Engineering
professionals concentrating on CAD for Integrated Circuit Design, has
been announced and the call for papers issued. For registration and
conference information,

Contact: H. Gill Lane
Racal - Vadic, Inc.
1525 McCarthy Blvd.
Milpitas, CA 95035, U.S.A.
Telephone: (408) 964-2227 ext. 2705

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