



# CAD/CAM

NEWSLETTER

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Information Compiled by the Canadian CAD/CAM Council

for the Advancement of Computer Integrated Manufacturing \*

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### 1. Reference Issue for Centres, Technical Societies & Major Conferences

In recent years it has been customary in the January issue of the CAD/CAM Newsletter to provide a cumulative reference listing to major sources of CAD/CAM information. This is helpful, particularly to new readers and persons newly involved with CAD/CAM technology who wish to ensure that they have arranged a regular and automatic flow of information which will keep them current on events and new developments. Usually, as a minimum, this involves a combination of several actions, such as establishing contact with one or more CAD/CAM centres, obtaining membership in one or more selected technical societies, and planning in the current year to attend at least one of the major CAD/CAM conferences.

To assist in this regard, the January Newsletter in the past has provided a cumulative listing of these three items; CAD/CAM centres, associations and technical societies and major conferences, with descriptive material on each. As usual, information in this issue is believed to be current, but the editor would be pleased to be advised of any errors or omissions.

This year the amount of descriptive material has been reduced, with emphasis primarily on the changes that have occurred in 1985. For those who wish, copies of the January 1985 reference issue are available from the secretariat of the CAD/CAM Council, as listed on page 22 of this issue.

A considerable number of new centres are listed for the first time in this issue, based on information from an NRC publication, which is available, as described in item 2 below.

As in previous years, it is planned that the February issue will continue as a reference index to regularly published journals, CAD/CAM Newsletters plus CAD/CAM directories and guides to commercial products.

As we move more and more towards computer integrated manufacturing, with all the changes, investments and benefits that this entails, it is already apparent that strategic planning by senior corporate management will play an increasingly needed and important role. The newsletter is read by many managers as well as technical specialists, planners and system developers. Readers may already notice an increasing emphasis of information on the management of the technology as well as on the technology itself. The CAD/CAM Council will be addressing this issue, the Canadian Management of Computer Integrated Manufacturing, quite fully in a special workshop/meeting in February 1986, and plans to issue a special report following the February meeting and workshop session.

Newsletter readers may note from information in this issue, that while there are many technical societies for CAD/CAM technology, there is apparently no association or society, at least yet, for CAD/CAM managers. Perhaps that will be the next sign of advance! Meanwhile the newsletter will partly fill that role, serving the CAD/CAM managers' need for information as well as indicating sources to information on the technical aspects of CAD/CAM and computer integrated manufacturing.

## 2. CAD/CAM Centres in Canada

Beginning primarily in 1983, and continuing throughout 1984-85, the number of CAD/CAM development and information centres in Canada increased considerably. There are now approximately seventy five such centres according to a recent listing. This includes twenty five in universities, a further twenty five in technical colleges and a further twenty five, not attached to educational institutions, whose services are directed primarily towards demonstrations and services stimulating awareness and applications in industry.

Detailed descriptions of these centres, their function, facilities, personnel, services, specialization, history and future plans is available in the NRC publication "A Reference Guide to CAD/CAM & Robotics Development and Information Centres in Canada & the U.S.A.". See the end of this section for details on the availability of this reference guide which also contains descriptive material on approximately forty selected centres in the U.S.A.

From west to east by province, the centres described in this publication are as follows. Centres not associated with educational institutions, whose services are primarily directed towards industrial clientèle are listed first. Most, if not all, of the centres associated with educational institutions also offer their services directly to industry as well as directing first priority to education, teaching and

the objectives of their parent institution.

BRITISH COLUMBIA

- National Research Council
  - Division of Mechanical Engineering, Western Laboratory, Vancouver
- North Western Technology Ltd.
  - Centre for Advanced Resource Technologies (CART), Prince George
- British Columbia Institute of Technology (BCIT)
  - BCIT CAD/CAM Centre, Burnaby
- Pacific Vocational Institute
  - Applied Technology Training Centre, Burnaby
- Simon Fraser University
  - Faculty of Engineering Science, Burnaby

ALBERTA

- Southern Alberta Institute of Technology, Calgary
- University of Alberta
  - Alberta Microelectronics Centre, Edmonton
- University of Calgary
  - CAD/CAM Facility, Mechanical Engineering Dept., Calgary

SASKATCHEWAN

- Saskatchewan Research Council
  - CAD/CAM Robotics Centre, Saskatoon
- Kelsey Institute of Applied Arts and Science
  - CAD/CAM Centre, Adv. Tech. Training Centre, Saskatoon
- Saskatchewan Technical Institute, Moose Jaw
- University of Saskatchewan
  - College of Engineering, Saskatoon

MANITOBA

- Manitoba Research Council
  - Industrial Technology Centre - CAE Division, Winnipeg
- Red River Community College, Winnipeg
- South Winnipeg Vocational Educ. Training Centre, Winnipeg
- University of Manitoba
  - NSERC-CAE Laboratory, Dept. of Mechanical Engineering, Winnipeg

ONTARIO

- Computer Integrated Manufacturing (CIM), Ancaster
- National Research Council
  - Division of Electrical Engineering, Ottawa
  - Division of Mechanical Engineering, Ottawa

- Ontario Centre for Advanced Manufacturing
  - Canada-Ontario Centre for Advanced Manufacturing-Windsor, Windsor
  - Ontario CAD/CAM Centre, Cambridge
  - Ontario Robotics Centre, Peterborough
- Ontario Centre for Automotive Parts Technology, St. Catherines
- Ontario Centre for Microelectronics Technology, Ottawa
- Ontario Research Foundation, Mississauga
  
- Carleton University
  - Centre for Advanced Studies in Computer-Aided Design & Engineering (CASCADE), Ottawa
- Centennial College of Applied Arts & Technology
  - CAD/CAM Facility, Scarborough
  - Robotics Centre, Scarborough
- Conestoga College of Applied Arts & Technology, Kitchener
- Durham College of Applied Arts & Technology, Oshawa
- Fanshawe College, London
- Humber College of Applied Arts & Technology, Rexdale
- McMaster University
  - Centre for Flexible Manufacturing R&D, Hamilton
- Mohawk College of Applied Arts & Technology, Hamilton
- Niagara College of Applied Arts & Technology
  - Manufacturing/Mechanical/Construction Div., Welland
  - Mechanical Engineering Technology, Welland
- Queen's University
  - The Canadian Microelectronics Corporation, Kingston
  - Dept. of Electrical Engineering Robotics Lab., Kingston
  - Dept. of Mechanical Engineering, Kingston
- Ryerson Polytechnical Institute
  - Centre for Advanced Technology Education (CATE), Toronto
- Seneca College of Applied Arts & Technology
  - Manufacturing Laboratories, Toronto
- Sheridan College of Applied Arts & Technology, Brampton
- Sir Sandford Fleming College of Applied Arts & Technology
  - Centre for Computer Integrated Manufacturing, Peterborough
- University of Toronto
  - Robotics & Automation Lab/CAD Laboratory, Toronto
  - Univ. of Toronto Microelectronics Dev. Centre, Toronto
  - VLSI Research Group (Dept. of Electrical Engineering), Toronto
- University of Waterloo
  - Waterloo Centre for Computer Integrated Manufacturing (WATCCIM), Waterloo
- University of Windsor
  - CAD/CAM Centre, Windsor

#### QUEBEC

- Centre de Recherche Industrielle du Québec (CRIQ), Montréal
- Centre d'Innovation Industrielle de Montréal, Montréal
- Centre Québécois pour l'Informatisation de la Production (CQIP), Montréal

- Conseil National de Recherche du Canada
  - Institut de Génie des Matériaux, Boucherville
- Hydro-Québec
  - Institut de Recherche d'hydro-Québec (IREQ), Varennes
- Institut Cartographique de Sherbrooke
  - Centre de Formation, Sherbrooke
- Institut National de la Recherche Scientifique
  - INRS-Télécommunications, Ile des Soeurs
- Quebec Apparel Productivity Centre, Montreal
- Service de la Cartographie, Sainte-Foy
  
- CEGEP de Jonquière
  - Centre de Production Automatisée, Jonquière
- CEGEP de la Pocatière
  - Centre Spécialisé de Technologie Physique, La Pocatière
- CEGEP de Lévis-Lauzon
  - Centre Spécialisé de Robotique, Lauzon
- College Lionel Groulx
  - Institut d'Ordinique du Québec, Sainte-Thérèse
- Concordia University
  - Centre for Building Studies (CBS), Montreal
  - Société d'Informatique et de Recherche pour l'Industrie de la Construction (SIRICON), Montréal
- Université Laval
  - Groupe pour l'Avancement de la Productique (GAP), Sainte-Foy
- Université McGill
  - Computer Vision and Robotics Laboratory, Montreal
  - Mechanical Engineering CAD & Robotics Group, Montreal
- Université de Montréal
  - Centre d'Activités en CAO (CACAO)  
École Polytechnique, Montréal
  - Vision and Robotics Laboratory, Montreal
- Université du Québec
  - Département de Production Automatisée, Montréal
- Université de Sherbrooke
  - Société de Microélectronique Industrielle de Sherbrooke (SMIS) Inc., Sherbrooke

NEW BRUNSWICK, PRINCE EDWARD ISLAND AND NEWFOUNDLAND\*

- New Brunswick Manufacturing Technology Centre
  - Research and Productivity Council (RPC), Fredericton
  - Research and Productivity Council (RPC), Edmundston
  
- New Brunswick Manufacturing Technology Centre
  - New Brunswick Comm. College, Bathurst Campus, Bathurst
  - New Brunswick Comm. College, Moncton Campus, Moncton
  - New Brunswick Comm. College, St-John Campus, Saint-John
  - Université de Moncton, Moncton
  - University of New Brunswick, Fredericton

NOVA SCOTIA

- Applied Microelectronics Institute, Halifax
- Technical University of Nova Scotia (TUNS)
  - Nova Scotia CAD/CAM Centre, Halifax

\* Agreement was made in 1984 under which the province of Prince Edward Island will participate in an expansion of this centre in a working agreement between the two provinces. An agreement has been reached on a similar memorandum of understanding with the Newfoundland Minister of Commerce and Development.

As indicated, the above listing of centres has been taken from "A Reference Guide to CAD/CAM and Robotic Centres" NRC Publication No. 24511.

This 380 page publication provides an index and guide for managers and technical personnel in industry to approximately seventy five 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. 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 as described in the report. Available in English or French. \$10.00. Prepaid orders only.

Contact: Publications  
Building R88  
National Research Council of Canada  
Montreal Road  
Ottawa, Ontario, K1A 0R6  
Telephone: (613) 993-2054

Some additional centres may also have been established since the above report was prepared. For example, as described in the May 1985 CAD/CAM Newsletter, the Vanier College CAD/CAM Institute in Montreal is providing college level courses to industry on a regular basis in addition to meeting the needs of full time students.

The Canadian Workplace Automation Research Centre, which has been established in Laval, Quebec is affiliated with the research sector of the federal Department of Communications. A primary objective of the centre is to assist users, including government, in defining their workplace automation needs and thereby help Canadian office equipment manufacturers to compete at home and abroad. The mandate of the centre is focussed on office automation.

A few organizations listed in the January 1985 Newsletter, and active in previous years, appear to have ceased active operations during 1985.

These include the National Computer Graphics Association (NCGA) in Toronto, the Western Foundation for Advanced Industrial Technology (WFAIT) in Vancouver and possibly the CAD/CAM Educators' Group pending the identification of additional persons to support its activities.

### 3. Canadian Regional and National Organizations

The following organizations, listed in alphabetical order, draw strength from their membership to whom they provide services, but with less emphasis on physical facilities than the centres described in Section 2 above.

#### - "CAD/CAM Association CAO/FAO"

The CAD/CAM Association (L'Association CAO/FAO) is an association formed in 1981 of individuals, companies and educational institutions with common interests in the application of computer technology to design, drafting, documentation, manufacturing, architecture, analysis, mapping, and research and development.

The association holds regular meetings in the Montreal area, sponsors an annual conference, usually in November or December, and publishes an information journal for its members.

Contact: CAD/CAM Association CAO/FAO  
P.O. Box 992, Desjardins Postal Station  
Montreal, P.Q.  
H5B 1C1  
Telephone: (514) 879-9049

#### - The Canadian CAD/CAM Council

The CAD/CAM Technology Advancement Council was established by the Department of Industry, Trade and Commerce in 1978 with members from industry, educational institutions and government. Objectives of the council include increasing the awareness, in industry and elsewhere, of the importance of this technology, and dissemination of information to encourage and assist CAD/CAM development and application in Canadian industry. The council, composed of fourteen invited members from industry and educational institutions plus four from government, normally meets four times per year.

In addition to its regular monthly CAD/CAM Newsletter, the council in 1980 issued its major report "Strategy for Survival" and in 1983 the supplementary report "Closing the Gap".

In 1985 the council announced adoption of a change on name and is now known as "The Canadian CAD/CAM Council for the Advancement of Computer Integrated Manufacturing.

Copies of the newsletter, council reports and other information are available on application.

Contact: Secretariat  
Canadian CAD/CAM Council  
Office of Industrial Innovation 5C  
Dept. of Regional Industrial Expansion  
235 Queen Street  
Ottawa, Ontario  
K1A 0H5  
Telephone: (613) 995-3741

- Canadian Advisory Committee for ISO/TC 184

The Standards Council of Canada has established a Canadian Advisory Committee, known officially by the abbreviation CAC/ISO/TC 184, for the purpose of;

- a) Following the work of ISO (International Standards Organization) Technical Committee on Industrial Automation Standards (ISO/TC 184) and its subcommittees and working groups, including receiving and studying documents and contributions from all other member bodies.
- b) Formulating Canadian opinion, recommending Canadian policies to the Canadian National Committee on ISO (CNC/ISO).
- c) Casting Canadian ballots on Draft Proposals and Draft International Standards.

Dr. V. Thomson of the NRC Division of Mechanical Engineering in Ottawa has agreed to be the chairman for CAC/ISO/TC 184 and is currently establishing its structure in order to deal effectively with Canadian interests.

Dr. M. Barakat of the NRC Division of Electrical Engineering in Winnipeg has been appointed by ISO to be the secretary for the ISO international subcommittee 3 dealing with non-device specific programming languages. Unlike the CAC above, which is composed entirely of Canadian representatives as its members, this international subcommittee has representatives from all the participating countries as its members and reports to the ISO in Paris.

Mr. J. Nassr, President of ICAM Technologies in Montreal has been nominated to ISO as the chairman for the international subcommittee 3 on non-device specific programming languages.

Further details on the committee and subcommittee structure is given in the August 1985 CAD/CAM Newsletter.

Persons wishing further information, or interested to participate in CAC/ISO/TC 184 should contact either;

W.J. Baigrie, P.Eng., Assistant Manager  
Technical Services Division  
International Standardization Branch  
Standards Council of Canada  
2000 Argentia, Suite 2-401  
Mississauga, Ontario  
L5N 1V8  
Telephone: (416) 826-8110

Dr. V. Thomson  
Building M-2  
Div. of Mechanical Eng.,  
National Research Council  
Montreal Road  
Ottawa, Ontario  
K1A 0R6  
Telephone: (613) 993-9461

- "Canadian Association for Production and Inventory Control"

The Canadian Association operates as region eight of the American Production and Inventory Control Society (APICS) as an association of professional practitioners involved in production and inventory control management.

Contact: A Fortin  
Canadian Association for Production and  
Inventory Control  
P.O. Box 107  
Kanata, Ontario  
K2K 1X3  
Telephone: (613) 592-2122

- "Canadian Industrial Computer Society (CICS)"

The Canadian Industrial Computer Society (CICS) is an outgrowth of the previous NRC Associate Committee on Automatic Control. The society issues a regular newsletter to members and sponsors the Canadian Conference on Industrial Computer Systems every two years, (1982, 1984, 1986, etc.) with specialized workshops on occasion in the intervening years.

Contact: Canadian Industrial Computer Society  
12 Kindle Court  
Ottawa, Ontario  
K1J 6E2  
Telephone: (613) 993-2834

- "Canadian Manufacturers' Association "MAT FORUM"

The CMA's Manufacturing Advanced Technology Forum (MAT FORUM) has been launched in 1984 to:

- communicate information on new innovations and developments in technology and systems
- provide an opportunity to exchange ideas with industry leaders
- place participants in contact with experts in a variety of fields

- generate new ideas and approaches
- help participants to gain employee acceptance of new products, processes and equipment
- help participants measure the performance of new technological applications

The MAT FORUM will be primarily oriented to senior management, plant engineers, plant managers, consultants, and other organizations engaged in activities related to manufacturing.

The MAT FORUM is open to any manufacturing company, or to representatives of any other private or public body interested in advanced technology, whether a CMA member or not. All CMA principal members will routinely receive information regarding the Forum's activities.

For additional information:

Contact: Marvin Zalman  
Consultant - Industrial Performance  
Canadian Manufacturers' Association  
One Yonge Street  
Toronto, Ontario  
M5E 1J9  
Telephone: (416) 363-7261

- "Canadian MAP Interest Group"

MAP, an acronym for Manufacturing Automation Protocol, was first proposed by General Motors as an industry specification which would eliminate the communications roadblock that currently exists between computers and computer-controlled devices, such as CAD/CAM systems, numerically controlled machines, robots and other manufacturing devices.

Approximately 200 major manufacturers in the United States are supporting MAP, and more than 30 computer equipment suppliers are now developing MAP compatible products. These will begin entering the marketplace in late 1985 and 1986. In 1985 the MAP Users' Group became a Technical Group within the Society of Manufacturing Engineers (SME), and receives administrative support from CASA/SME headquarters. A European MAP group is also being organized by major companies in Western Europe.

The Canadian MAP Interest Group will support the international MAP development effort and address issues of particular interest to Canada.

The Canadian interest group, which is affiliated with the U.S.-based MAP Users Group, wants to ensure that Canadian industry is able to profit from the benefits and opportunities of MAP. In addition, it wants to ensure that Canadian standards are compatible with U.S. and international

standards in factory automation. Corporate, associate and individual memberships are available.

For more information on the Canadian MAP Interest Group, please contact:

Robin Haighton, P.Eng.  
Secretary  
Canadian MAP Interest Group  
c/o Canadian Standards Association  
178 Rexdale Boulevard  
Rexdale, Ontario  
M9W 1R3  
Telephone: (416) 747-4017

- CASA/SME Chapter

The first chapter in Canada of the Computer and Automated Systems Association (CASA) of the Society of Manufacturing Engineers (SME) has been formed in Toronto. CASA/SME is an educational and scientific association founded in 1975 for computer and automation systems professionals and will reach 10,000 members in 1985.

Membership of the SME is now approximately 75,000. The CASA division of SME was created to provide comprehensive and integrated coverage of computers and automation in the advancement of manufacturing. The "Ontario" chapter holds regular meetings and site visits in the vicinity of Toronto.

For further information contact:

K. Berlenbach  
Program Chair  
Telephone: (416) 746-7360

or W. Pischel  
Chairman  
Telephone: (416) 845-5901

- "Ottawa-Carleton CAD/CAM Society"

The Ottawa-Carleton CAD/CAM Society holds informal meetings at approximately two months intervals. Meetings typically take the form of a one-half morning technical presentation and review of systems implementation at the site of a major industrial user such as Mitel, Computing Devices of Canada, Bell-Northern Research, or an educational centre or research facility such as Carleton University, University of Ottawa, Algonquin College, or NRC.

Contact: Dr. V. Thomson  
Analysis/Control Systems, Bldg. M-2  
Division of Mechanical Engineering  
National Research Council of Canada  
Montreal Road  
Ottawa, Ontario  
K1A 0R6  
Telephone: (613) 993-2321

- Robotics International of SME

The Central Ontario Chapter (Number 306) of Robotics International of SME holds regular monthly meetings in Toronto and vicinity.

Contact: Robotics International of SME  
Central Ontario Chapter No. 306  
P.O. Box 392, Station A  
Brampton, Ontario  
L6V 2L3

For membership information telephone: R. Kocheft (416) 494-3888.

4. Major Technical Societies

- Computer Aided Manufacturing - International, Inc. (CAM-I)

CAM-I is a not-for-profit industrial research and development organization with over one hundred industrial members, mainly in the U.S.A., but including members and divisions in Europe and Japan. CAM-I members sponsor major development projects and program activities on a shared cost basis. An extensive library of software and study reports is available, much of which is in the public domain and can be purchased at nominal cost.

While many project and committee meetings are closed to the public, the annual technical conference is open to non-members as well as members.

Contact: Computer Aided Manufacturing - International, Inc.  
611 Ryan Plaza Drive, Suite 1107  
Arlington, TX 76011, U.S.A.  
Telephone: (817) 860-1654

- "Institute of Industrial Engineers"

Provides services to its members and holds an annual conference, scheduled for May 11-15, 1986 in Dallas, Texas.

Contact: Institute of Industrial Engineers  
25 Technology Park/Atlanta  
Norcross, GA 30092, U.S.A.  
Telephone: (404) 449-0460

- "The Society of Manufacturing Engineers (SME)"

The Society of Manufacturing Engineers (SME) has over 79,000 members in 65 countries and maintains a very active technical program. Their organizational structure includes two special divisions;

1. The Computer and Automated Systems Association of SME, (CASA/SME) which now has approximately 10,000 members.
2. Robotics International of SME (RI/SME) which now has over 11,000 members.

Each of the above has special publications and activities in its field. In addition a machine vision group has been established which is expected to be chartered as an SME division when membership reaches two thousand. The U.S. MAP users group has also been established and has several hundred members and attendees at its meetings concerned with the Manufacturing Automation Protocol (MAP). For information on the Canadian MAP Interest Group, CASA/SME and RI/SME Chapters in Canada see the preceding section.

The SME and its divisions sponsor major conferences, each with several thousand attendees, such as AUTOFACT, the annual Robots Conference etc., and well over one hundred specialized conferences, workshops and seminars. The SME is the principal sponsor of the 5th Canadian CAD/CAM Conference and Exhibition, to be held in Toronto, June 17-19, 1986.

Major SME publications include:

- "Manufacturing Technology" published monthly by SME
- "CIM Technology" published quarterly by CASA/SME
- "Robotics Today" published six times annually by RI/SME

Contact: Society of Manufacturing Engineers  
P.O. Box 930  
One SME Drive  
Dearborn, MI 48128, U.S.A.  
Telephone: (313) 271-1500

- "SME Computerized Automation & Robotics Information Centre (CARIC)"

The Society of Manufacturing Engineers (SME) began operation in 1982 of a Computerized Automation and Robotics Information Centre (CARIC) at its world headquarters in Dearborn, Michigan to gather and disseminate technical data and other information on automation and robotics.

Contact: Computerized Automation & Robotics  
Information Centre (CARIC)  
Society of Manufacturing Engineers  
One SME Drive, P.O. Box 930  
Dearborn, MI 48128, U.S.A.  
Telephone: (313) 271-5340

- "Robotic Industries Association (RIA)"

The Robotic Industries Association (RIA), formerly known as the Robot Institute of America, while not a technical society is included in this listing for clarification purposes. The RIA, founded in 1974, is the trade association serving North America. From its headquarters in the SME Building, Dearborn, Michigan, the RIA sponsors the largest robot exhibition in the world and conducts industry-related programs for over 200 member companies. The Robots 86 Exposition will be held April 20, 24, 1986 at McCormick Place, Chicago. The Association has a number of publications available to both members and non-members as described in the RIA Publications Catalog which is available on request.

Membership in the RIA is open to organizations involved in the manufacture, distribution, usage, and research of robot equipment.

Contact: Robotic Industries Association  
One SME Drive  
P.O. Box 1366  
Dearborn, MI 48121, U.S.A.  
Telephone: (313) 271-7800

- "Association for Integrated Manufacturing Technology"

Formerly known as the Numerical Control Society, the newly named Association for Integrated Manufacturing Technology (AIM-TECH), maintains activities on many aspects of CAD/CAM as well as numerical control. Canadian chapters maintain local activities in Montreal, Central Ontario and British Columbia. The society publishes a journal "I.M. Report" and will hold its annual general meeting "A New Beginning" in Minneapolis, May 4-7, 1986.

Contact: Association for Integrated Manufacturing Technology  
P.O. Box 1234  
Beloit, WI 53511, U.S.A.  
Telephone: (608) 364-7949

- "The IEEE Computer Society"

The IEEE Computer Society with more than 50,000 members, is part of the 200,000 member Institute of Electrical and Electronic Engineers.

Contact: IEEE Computer Society  
1730 Massachusetts Ave., N.W.  
Washington, DC 20036-1903, U.S.A.  
Telephone: (202) 371-0101

- "The Association for Computing Machinery (ACM)"

The activities of the Association for Computing Machinery (ACM) in the CAD/CAM field stem primarily from its annual major conference on computer graphics (SIGGRAPH), its special interest group on design automation (SIGDA) and its extensive publication activity for which the "ACM Publications Catalog" is available.

Contact: Association for Computing Machinery (ACM)  
11 West 42 Street  
New York, N.Y. 10036, U.S.A.  
Telephone: (212) 869-7440

- "National Computer Graphics Association (NCGA)"

The National Computer Graphics Association (NCGA) sponsors an annual conference and other activities. Computer Graphics 86 sponsored by NCGA will be held in Anaheim, California, May 11-15, 1986.

Contact: NCGA  
2722 Merrilee Dr.  
Fairfax, Virginia 22031, U.S.A.  
Telephone: (703) 698-9600

- "Society of Automotive Engineers (SAE)"

The Society of Automotive Engineers (SAE) has a number of CAD/CAM publications available, particularly in the area of robotics.

Contact: Society of Automotive Engineers (SAE)  
Department 721  
400 Commonwealth Drive  
Warrendale, PA 15096, U.S.A.  
Telephone: (412) 776-4841

- "Canadian Society for Mechanical Engineering (CSME)"

A constituent society of the Engineering Institute of Canada (EIC). Technical sessions on CAD/CAM are frequently included as part of the Annual General Meeting.

Contact: Engineering Institute of Canada  
700 EIC Building  
2050 Mansfield Street  
Montreal, P.Q.  
H3A 1Z2

- "Canadian Society for Civil Engineering (CSCE)"

A constituent society of the EIC (see above).

- "Canadian Society for Electrical Engineering (CSEE)"

A constituent society of the EIC (see above).

- "IEEE Canadian Office"

The Institute of Electrical & Electronic Engineers maintains a Canadian (Region 7) office in Toronto to provide services to the Canadian members and IEEE sections in many Canadian cities.

As one of the services of this office, a complete range of IEEE standards documents is maintained so that they may be purchased in Canadian funds and without customs delays, etc. This includes the ANSI/IEEE standards 802.2, 802.3, 802.4, 802.5 as described in the May 1985 CAD/CAM Newsletter, which are closely related to the MAP protocol.

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

- "User's Groups of the CAD System Vendors"

CAD and related systems developments are regularly presented in a conference like format at user group meetings held under the aegis of CAD system vendors and may be available to attendees on payment of a

conference registration fee. For example, the Computervision Users' Group, which has East, mid West and West coast divisions in the U.S.A., may be reached by contacting: Sharon Boyle, telephone (617) 275-1800 extension 5364 in Bedford, Massachusetts.

- "World Computer Graphics Association"

Sponsors a number of conferences in various countries each year including the "Defence & Government, Computer Graphics Conference" to be held at the Washington Convention Centre, Washington, D.C., October 27-31, 1986.

Contact: World Computer Graphics Association  
2033 M Street N.W., Suite 399  
Washington, D.C. 20036, U.S.A.  
Telephone: (202) 775-9556

5. Major Conferences for 1986

There are many technical society meetings and conferences held on an annual basis. The following lists some of the largest and best known. 1986 dates are given where known. In any cases where a 1985 date is given it can be assumed that the conference is held on an approximately annual basis and the conference sponsor or the previous conference organizer may be contacted for new information regarding the 1986 equivalent as soon as it is available. Those with only 1985 dates are indicated by an \*.

In addition many of the CAD/CAM centres listed in section 2 of this newsletter hold regular seminars and courses, usually on their premises, and may be contacted concerning these.

Following past practise, additional CAD/CAM conferences, workshops and seminars deemed of sufficient interest to readers and having sufficient advance notice will be listed in the newsletter throughout the coming year as information becomes available.

- "CIMTECH '86"

March 10-13, 1986, Boston, U.S.A.

A new expanded version of the previous CIMCOM - Computer Integrated Manufacturing and Communications Conference and Exhibit.

Contact: Society of Manufacturing Engineers  
Telephone: (313) 271-1500 ext.: 374

- "Systems 1"

March 24-26, 1986, Chicago, Illinois

An International Conference and Exposition on Plant Automation, Communication and Control sponsored by Computer & Business Equipment Manufacturers' Association (CBEMA), National Electrical Manufacturers' Association (NEMA), Electrical Industries Association (EIA) and the Society of Manufacturing Engineers (SME).

Contact: SME Telephone: (313) 271-1500

- "1986 IEEE International Conference on Robotics & Automation"  
April 7-10, 1986, San Francisco Hilton & Tower, San Francisco  
Contact: IEEE Computer Society,  
Washington, D.C.  
Telephone: (202) 371-0101

- \* - "CIM Industry Days"  
April 9-12, 1985, Dallas, Texas

An annual meeting held to inform industry participants of activities conducted under the USAF Integrated-Computer Aided Manufacturing (I-CAM) project.

Contact: Jane Dunn  
Telephone: (513) 278-0681

- "Robots '86"  
April 20-24, 1986, McCormick Place, Chicago  
Contact: Robotics International/Society of Manufacturing Engineers

- "Computer Graphics '86"  
May 11-15, 1986, Anaheim, California  
Contact: National Computer Graphics Association  
Telephone: (703) 698-9600

- "Industrial Engineering Conference"  
May 11-15, 1986, Dallas, Texas

The Annual Conference of the Institute of Industrial Engineers.  
Contact: Telephone: (404) 449-0460

- "EIC Congress"  
May 13-16, 1986, Inn on the Park, Toronto  
Contact: Engineering Institute of Canada  
Montreal, Quebec

- "Graphics Interface '86"  
May 26-30, 1986, Vancouver, B.C.

Graphics Interface '86 will be the twelfth Canadian Conference devoted to computer graphics and interactive techniques, and is the oldest regularly scheduled computer graphics conference in North America. Now an annual conference and film festival, Graphics Interface has established a reputation for a high-quality technical program. The 1986 conference will be held in Vancouver 26-30, May 1986 in conjunction with Vision Interface '86 and is sponsored by the Canadian Man-Computer Communications Society.

Contact: Dr. G. Schrock  
Dept. of Electrical Engineering  
University of British Columbia  
Vancouver, B.C.  
V6T 1W5  
Telephone: (604) 228-2326

- "1986 Canadian Conference on Industrial Computer Systems"  
May 28-30, 1986, Ecole Polytechnique, Montréal

Contact: Dr. R. Gagné,  
Systems Laboratory  
Division of Mechanical Engineering  
National Research Council  
Ottawa, Ontario  
K1A 0R6  
Telephone: (613) 993-2030

- "Vision '86: International Conference & Exposition on Applied Machine Vision"

June 3-5, 1986, Detroit, Michigan  
Contact: Society of Manufacturing Engineers,  
Telephone: (313) 271-1500

- "SYNERGY '86"

June 16-18, 1986, Sheraton Universal Hotel, Universal City, California

Conference will focus on integrating production and inventory control within the total manufacturing enterprise.

Contact: SME  
Technical Activities Dept.  
Telephone: (313) 271-1500 ext. 374

- "5th Canadian CAD/CAM & Robotics Conference & Exposition"  
June 17-19, 1986, International Convention Centre, Toronto

Contact: Society of Manufacturing Engineers  
Telephone: (313) 271-1500

- "23rd ACM/IEEE Design Automation Conference"

June 29 - July 2, 1986, Las Vegas, Nevada  
Contact: ACM or IEEE

- "ACM SIGGRAPH '86"

August 18-22, 1986, Dallas, Texas  
Contact: Ellen Gore, ISSCO  
10505 Sorrento Valley Rd.  
San Diego, CA 92121, U.S.A.  
Telephone: (619) 452-0170

- "Robotics Research: The Next Five Years and Beyond"

August 19-21, 1986, Scottsdale, Arizona

This is the second world conference in this series on robotics research.

Contact: SME Telephone: (313) 271-1500 ext. 359

- "International Machine Tool Show - IMTS"  
September 3-11, 1986, McCormick Place, Chicago

This very large event is held alternately in Hanover, Germany and Chicago, U.S.A. Early registration and hotel accommodation is essential.

Contact: National Machine Tool Builders Association (NMTBA)  
7901 Westpark Drive  
McLean, VA 22021, U.S.A.  
Telephone: (703) 893-2900

- "Ultra Tech '86"  
September 22-25, 1986, Long Beach, California

A set of eight concurrent conferences and exposition, including;

- The MAP Conference
- Artificial Intelligence in Manufacturing
- Automated Guided Vehicles
- FINSTRAT
- Human Aspects of Automation
- Robots West
- Simulation
- Vision West

Contact: Society of Manufacturing Engineers  
Telephone: (313) 271-1500 ext.: 369

- "16th International Symposium on Industrial Robots"  
September 29 - October 2, 1986, Brussels International Trade Fairs, Belgium

Contact: IFS (Conferences) Ltd., U.K.  
or Brussels  
Telephone: 32-2-478 48 60

- \* - "Toronto Tool and Manufacturing Conference & Exposition"  
October 2-4, 1985, The International Centre, Toronto

Contact: Society of Manufacturing Engineers  
Telephone: (313) 271-1500

- "Design Automation Workshop"  
October 8-10, 1986, Lansing, Michigan,  
Sponsored by IEEE Computer Society

Contact: Design Automation Workshop  
P.O. Box 639  
Silver Spring, MD 20901  
Telephone: (301) 589-8142

- "CAM-I Annual Meeting and Technical Conference"  
October 13-15, 1986, San Antonio, Texas

Contact: Computer Aided Manufacturing - International, Inc.  
Telephone: (817) 860-1654

- "AUTOFACT '86"  
November 12-14, 1986, Detroit, Michigan

Contact: Society of Manufacturing Engineers  
Telephone: (313) 271-1500

- \* - "ICCAD '85"  
November 18-21, 1985, Santa Clara, California

The IEEE International Conference on Computer Aided Design (ICCAD) was held as above. The conference concentrates on CAD for integrated circuit design with tutorials, workshops and technical papers.

Contact: IEEE Computer Society or ACM SIGDA

- \* - "CAO/FAO 1985 CAD/CAM"  
December 3-5, 1985, Palais des Congrès, Montréal

Contact: CAD/CAM Association CAO/FAO  
Telephone: Albert Dicesare (514) 879-9049

## 6. Book Reviews

"Restoring our Competitive Edge: Competing Through Manufacturing" - R.H. Hayes, S.C. Wheelwright, John Wiley & Sons 1984, 427 pp., hard cover. Price approximately \$19.95 (U.S.)

Two authors, both with graduate business schools in the U.S.A. and extensive consulting experience, use their knowledge to develop a detailed appraisal of differences between American firms and their counterparts in Germany and Japan. The thesis of the book is that firms in the U.S.A. have seen their competitive edge slip away due to over attention on marketing and financial matters, to the neglect of manufacturing as a strategic resource. The gap that has developed is seen as enormous. In the U.S.A. the relative lack of technological education among industry managers (and the public at large) results in a misunderstanding of technology to the point of being a technology phobia. Strategic measures for firms to regain international competitiveness are discussed at length in business management terms since the decline in productivity is seen as a management problem due to differences in that area rather than as a government problem. Two alternative strategies for manufacturing development are discussed and compared; the "strategic-leap" approach which may create heroes but requires much dependence on external sources of knowledge such as consultants, and the "incremental" approach which can achieve steady, consistent, results, but which places greater responsibility on developing and supporting regular employees, and on maintaining awareness as opposed to falling asleep. The

book is suitable for thoughtful reading by engineers, managers and above all by executive level personnel in industry to whom it is primarily addressed. While the book is based on the writer's knowledge of conditions in the U.S.A., the observations are probably equally valid in Canada - perhaps even more so.

Reviewed by: J. Scrimgeour, Division of Electrical Engineering, NRC. Mr. Scrimgeour has approximately thirty eight years experience in design, manufacturing, systems engineering, consulting and advisory experience in Canadian industry and government.

#### 7. CAD/CAM Articles of Recent Interest

- "What I Wish I Had Known About CAD Software" - S. Lord, Mechanical Engineering, Nov. 1985, pp. 24-34.

This article may be of interest to many persons interested in evaluating low cost CAD software packages as it reviews in detail six programs, all of which run on the IBM PC/AT or compatible equivalents. The six packages reviewed are of two types; two dimensional drafting packages (Auto CAD 2, Versa CAD Advanced, Anvil 1000 MD) and three dimensional design packages (Design Board Professional, CADkey, Personal Designer). Comparison and discussion are made based on a table of approximately 50 attributes including pixel display limits, user-defined macros, sketch mode, ordinate dimensioning, number of layers, rubber banding, text association, perspective views, copy protection and IGES compatibility. Vendor prices and addresses are given. Other factors such as dealer support, continuity and training are discussed briefly.

- Computer-Aided Design/Drafting on Personal Computers - K.E. Sibbald, Proceedings of the IEEE, December 1985, pp. 1807-1816.

The dramatic growth in personal computer (PC) based CAD systems is described. While the two most widely used mainframe systems CADAM and Computervision have reached 16000 and 12000 workstations installed, respectively, over a 10 year period, the developers of AUTOCAD by January 1985 in a 21 month period had licensed over 16000 workstations worldwide, making it the most widely used CAD software system. It is estimated that PC based software is now in use at over 30,000 locations worldwide. The paper presents an authoritative and tutorial review of the design features, and their merits, to be found in most PC based systems. 29 references plus a list of seven system suppliers.

#### 8. Twenty Selected Abstracts for a World Update on CAD/CAM

For a review of CAD/CAM developments around the world and recommended further reading to help keep your organization informed on the challenges and opportunities involved, see the selection of twenty CAD/CAM abstracts in the section attached for this month.

As many newsletter readers are aware, the information in the abstracts section is far from being just "abstract" or just "academic". The references cited are not widely available elsewhere in this form, not

necessarily in the hands of the right people and genuinely new to almost all newsletter readers each month. Almost every entry identifies either a competitive push or market pull --, threat or opportunity. Many provide advise and consultation to management that would cost several thousand times more if obtained independently or by special study.

While the abstracts are informative in themselves, copies of most of the articles cited can be obtained from your nearest technical library or from the Canada Institute for Scientific and Technical Information (CISTI) as noted in the abstracts section.

9. CAD/CAM Quotes

- "We've had to come up with high-quality products and do things in a way that makes us more competitive," says Nick Hall, a General Motors spokesman in Oshawa. "Bringing in new technologies has improved our international competitiveness - there's no question about it."
- "One in five parts suppliers now uses robots. Two out of three expect to use them by 1990."
- "The auto industry is the leading industry in Canada to recognize that its long-term survival depends upon shoring up productivity with new technologies, manufacturing techniques and materials."
- "At a time when Canadians are wondering where new jobs and wealth are going to come from to maintain both our standards of living and our national sovereignty, the auto industry's high-technology turnaround offers some key lessons."

Science Gives Auto Industry a Boost, The Toronto Star, November 25, 1985.

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