

CAD/CAM

NEWSLETTER

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February 1986

Information Compiled by the Canadian CAD/CAM Council

for the Advancement of Computer Integrated Manufacturing *

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1. Feedback Requested from Readers

It is important for any organization to know their market and to obtain feedback from those they serve. Accordingly, letters from readers of the CAD/CAM Newsletter are invited by the editor, as indicated below. While a detailed reader response survey may be initiated at a later date when resources are established for tabulation, letters are invited from readers at the present time for guidance and support of the newsletter's function.

The CAD/CAM Newsletter, which began in 1979, has grown steadily to the point where it is received by close to three thousand individuals who have requested receipt on a regular basis in view of their activity in CAD/CAM technology development and application.

Feedback received from time to time from industrial companies has always been positive, giving encouragement to regular preparation and distribution of the newsletter. It is appropriate, however, at this time, to request readers for additional feedback.

It has always been the intent of the newsletter to assemble and provide information in a single package which otherwise tends to be widely scattered and not readily available elsewhere. One objective is to save

readers time in obtaining valuable information, and possibly also to assist in providing a wider perspective on CAD/CAM than might otherwise be obtained. The policy focus of the newsletter is on alerting readers to what is available and where it can be obtained. In some cases the newsletter gives informative summaries of the information available but it does not contain full length papers since these are available in existing journals and other publications. The newsletter, by its policy, avoids information of a product or commercial nature which are also widely available elsewhere. In the same way the newsletter avoids competition with other publications and in fact, reprinting of the newsletter contents is recommended in other Canadian publications as much as possible.

A fundamental objective of the newsletter is to assist Canadian industry in making the transition from the manufacturing methods of the past to the computer integrated manufacturing methods of today and the future. This is a massive undertaking when viewed across all industry sectors. If the newsletter can assist by providing information in a timely and time saving form, its objective will have been met.

Brief letters from readers, addressed to the editor, indicating how the CAD/CAM Newsletter is of use to them, and possibly noting which sections are the most useful would be appreciated.

Contact: J. Scrimgeour
Editor, CAD/CAM Newsletter
Division of Electrical Engineering
Building M-16
National Research Council
Ottawa, Ontario
K1A 0R6

2. Special Workshop on the Canadian Management of CIM

The Canadian CAD/CAM Council, in conjunction with the School of Business Administration at the University of Western Ontario, recently held a special two day workshop or "think-tank" on the Canadian Management of Computer Integrated Manufacturing (CIM).

For the purposes of this activity, the members of the CAD/CAM Council, who donate their time and knowledge to the council's activities, were joined by leaders from Canada's business community, the School of Business Administration and other invited participants.

A high degree of synergism and expert knowledge was displayed in the discussions which were structured to give insight into the Canadian management of CIM technology, now and in future years. CIM is seen by the participants as a strategic and economic necessity for Canadian industry. The only questions are how much and when, and how to bring this to the attention of senior industry managers.

A report will be issued by the council, and is planned for distribution at the earliest opportunity. This new report, focussing on the management requirements and problems of computer integrated manufacturing, will be an addition to the council's previous reports in 1980 and 1983 which have proven highly influential in shaping the Canadian infrastructure for the adoption of CAD/CAM and Computer Integrated Manufacturing (CIM) technology.

Observations & Conclusions

1. Choosing the time for implementation of CIM is a critical management decision. It must not be left too late, because the pay-back from the first chosen application is needed to fund later development and applications in the company. Also, application needs to be started reasonably soon so that both management and technical staff can learn by doing. If delayed and left too late, the learning curve becomes vertical and almost impossible to ascend.
2. CIM is not a single technology. It is a philosophy and a direction affecting the whole company. It is really only achieved as an evolution in a series of stages towards an end. The important thing is to get started, at the right time, before it is too late, and using the savings from the first stages to pay for those that follow.
3. Because of its nature, reliance on traditional vendor-customer channels will lead to a slow adoption process, particularly in small companies. Equipment vendors, such as those for machine tools, can only allow a limited amount of expense for customer education, and not nearly enough for a subject as complex as CIM. Other media, normally relied upon heavily, such as the daily and trade press, are limited by available page space.

An additional gap exists because users have not been accustomed in the past to regarding manufacturing as a strategic weapon. Bridging this recognition gap is vital.

4. Senior management involvement and support is needed to initiate successful CIM projects. Obtaining this, with dedication and understanding, is difficult. Obtaining it is essential due to the integrated nature of CIM. Many divisions of the company are affected simultaneously. Investment in one area may be essential to obtain savings in another.
5. A large and growing need for company or in plant training is foreseen, first for managers and senior technical personnel, and later for operational personnel.
6. CIM, to a large degree, produces savings from reductions in overhead, reduced inventory, better, faster, more accurate information flow, reduced cycle times for design and manufacture and improved quality. Just what is needed in many instances, but traditional accounting and

justification procedures will need modification to recognize these overhead and efficiency related factors. The difficulty of establishing economic justification may be a more difficult problem than the actual availability of funds.

7. While it appears to have escaped significant or serious consideration to date, the readiness of Canadian industry to adopt the most modern manufacturing methods, such as CIM, may be a determining factor to successfully compete in a free trade environment with stronger and better positioned competitors. A government role, as well as private sector activity, is implied in this consideration and its implications.
8. Factory automation has become big business. The 1985 Autofact Conference, held in Cobo Hall in Detroit, attracted over 3000 conference attendees and over 33,000 exhibit attendees, making it the largest event ever held in Cobo Hall, and exceeding the 1980 Republican Convention. By comparison, in 1975, ten years earlier, the SME CAD/CAM Conference which was the predecessor of the AUTOFACT series, attracted the attention of approximately 150 persons, of which only one or two were Canadians.

The Society of Manufacturing Engineers (SME) estimates the growth of sales in North America on factory automation to reach \$36-40 billion by 1995, from a current figure of \$7 billion in 1982 and \$14 billion estimated for 1987. Other industry estimates in the U.S.A. are \$25 billion in 1985, \$50 billion by 1990, and close to \$100 billion by 1995. The point is that these are substantial numbers, fed by a real and rapid growth.

9. The key to the major education and communication problem with CIM is to convince people to read the signs differently than in the past. CIM is not for all companies at the same time. Different companies need different parts at different times, but it has to be managed to make it happen.
10. CIM is not just something affecting only the "high technology" sector, which is really only a small portion of the total economy. Rather, it is the application of CIM and other advanced technologies, across all the traditional sectors of the economy which will really yield the maximum employment gain in the long run.
11. The gap between curves for total labour force and employment is normally viewed as the vertical gap between them. That is, as an unemployment gap, typically in the range of ten percent. Alternatively, in attempting to bring these two curves closer together, we could begin to look more closely at the horizontal difference between them -- a time difference of approximately three years. It could be that the processes of job creation do work, eventually. Maybe the problem is mainly that we tend to be behind schedule.

Recognizing this, and the role of technology diffusion, which also tends to lag two to three years behind our major competitors, could reveal that effective technology development, transfer and diffusion could be worth a lot more than has been realized.

For copies of the report, contact:

Secretariat
Canadian CAD/CAM Council
Office of Industrial Innovation, 5th Floor Centre
Department of Regional Industrial Expansion
235 Queen Street
Ottawa, Ontario
K1A 0H5

3. Reference Information Issue

- Regularly Published Journals

The following journals are either fully devoted to CAD/CAM technologies, or frequently contain a significant number of articles related to CAD/CAM technologies. Since the number of available publications is constantly growing, the emphasis in this updated listing is on those which are of an applications nature and primarily those originating in North America. Some publications have been added to the listing previously provided in the February 1985 CAD/CAM Newsletter, and some have been deleted, particularly those of a highly research nature or where it was not possible to readily verify the content of the publication. Entries below are grouped primarily by subject (CAD, Mechanical Engineering, Metalworking, Robotics, etc.) and also are in approximate alphabetical order.

Here is your opportunity to check the listings, see which you already have on hand, and ensure that you are receiving a reasonable sample to keep you informed of changes taking place.

For those items published by the technical societies listed in the January 1986 CAD/CAM Newsletter, please refer, where necessary, to the addresses given therein for contact. In many cases, the journal referred to is received by society members as part of their membership fee, or may be obtained by separate subscription at rates usually in the \$30-\$60 range. All rates, where given, are based on information available, but subject to change.

- "Assembly Engineering" - Published monthly. Contains articles on robotics, artificial intelligence in manufacturing, etc. \$75 (U.S.) in Canada.

Contact: Hitchcock Publishing Company
Hitchcock Building
Wheaton, IL 60188, U.S.A.

- "American Machinist" - Published Monthly. Contains articles on robotics, systems integration and special reports for in-depth presentation of selected topics. Controlled circulation publication. Subscription \$40 (U.S.) in Canada.

Contact: McGraw-Hill Inc.
1221 Avenue of the Americas
New York, NY 10020, U.S.A.

- "Automation" - The Journal of Automated production. Contains articles on Computer Integrated Manufacturing, robotics, flexible manufacturing systems in industry etc., with an emphasis on applications and developments in the U.K. and Europe. Available by subscription outside the U.K. and Ireland \$115 (U.S.).

Contact: United Trade Press Ltd.
UTP House 33-35 Bowling Green Lane
London EC 1R ODA
England

- "Automation News" - To commence publication 18 times per year in tabloid newspaper format commencing March 14, 1983 with plans to become biweekly later in 1983. Both paid and unpaid circulation.

Contact: Automation News
160 East 47th Street
New York, NY 10017, U.S.A.
Telephone: (212) 223-0232

- "CAD/CAM and Robotics" - A Canadian trade publication with inaugural issue published in June 1983. Currently published bimonthly. Articles on CAD/CAM management, economic justification, company case histories, product reviews and courses at educational institutions are regularly included plus mini-directories on occasion to CAD/CAM products and services.

Contact: Kerrwil Publications Ltd.
501 Oakdale Rd.
Downsview, Ontario
M3N 1W7
Telephone: (416) 746-7360

- "CIM Technology" - Published quarterly by the Computer and Automated Systems Division of the Society of Manufacturing Engineers (CASA/SME) to provide regular information on Computer Integrated Manufacturing (CIM) to its members and subscribers. Non-members rates within U.S.A. \$60 (U.S.), others available on request.

Contact: Society of Manufacturing Engineers
P.O. Box 930
Dearborn, MI 48121, U.S.A.

- "Commline - The Journal of Computerized Manufacturing" - Published bimonthly by Numeridex. Free of charge to qualified readers.

Contact: Commline
241 Holbrook Drive
P.O. Box 11000
Wheeling, IL 60090, U.S.A.
Telephone: (312) 541-9084

- "Computer and Control Abstracts" - A monthly publication produced by INSPEC. Published monthly by the Institution of Electrical Engineers (IEE) and the Institute of Electrical and Electronic Engineers (IEEE). Contains approximately 4000 reference titles and abstracts each month of which approximately 100 are in the CAD/CAM and robotics field and of which 20 are reproduced by permission each month in the CAD/CAM Newsletter. Subscription \$705 (U.S.).

Contact: Fulfillment Manager
Institute of Electrical and Electronic Engineers (IEEE)
445 Hoes Lane
Piscataway, NJ 08854, U.S.A.
Telephone: (201) 981-0060

- "Canadian Consulting Engineer" - A monthly controlled circulation publication. Contains articles on CAD in architecture, engineering, construction and consulting engineering practise. Subscriptions are only accepted from registered professional engineers in consulting engineering practise, rate \$33 annually.

Contact: Canadian Consulting Engineer
Southam Business Publications
1450 Don Mills Rd.
Don Mills, Ontario
M3B 2X7

- "Control Engineering" - Published monthly, except for October and November when published semimonthly. Contains articles on control engineering in the process industries, as well as increasing emphasis on discrete parts manufacturing industries. Controlled circulation publication in the U.S.A. or \$65 (U.S.) annually in Canada.

Contact: Technical Publishing
Division of Dun-Donnelley Publishing Corp.
1600 North Main Street
Pontiac, IL 61764, U.S.A.
Telephone: (312) 381-1840

- "Electronics" - For a list of approximately twenty five publications recommended by the Ontario Centre for Microelectronics, dealing with CAD applied to both integrated circuits or printed circuit boards, see the CAD/CAM Newsletter, August 1984.

- Regular Publications from IFS

- "The Industrial Robot" News, features and technical articles. Published quarterly, \$99 (U.S.) in North America.
- "Sensor Review" Covers all aspects related to manufacturing automation. Published quarterly, \$115 (U.S.) in North America.

- "The FMS Magazine" An international quarterly publication, \$99 (U.S.) in North America.
- "Assembly Automation" Includes robot assembly automation. Published quarterly, \$99 (U.S.) in North America.

Contact: IFS (Publications) Ltd.
35-39 High Street
Kempston, Bedford, England MK42 7BT
Telephone: (0234) 853605 Telex: 825489

- "I & CS - The Industrial and Process Control Magazine" - Published monthly. Contains articles on networking in manufacturing environments, Manufacturing Automation Protocol (MAP) etc. \$55 (U.S.) in Canada.

Contact: Chilton Company
Chilton Way
Radnor, PA 19089, U.S.A.

- "IM Report" - The Integrated Manufacturing Report is published six times per year by the Association for Integrated Manufacturing Technology (formerly the Numerical Control Society) for the information of its members.

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

- "Interfaces in Computing" - A quarterly journal with an international advisory board publishes papers in English, French or German on topics concerning interfaces in computing. For example, material already covered has dealt with CAMAC, Ethernet, the Cambridge Ring and it is possible that papers on Factory Area Networks (FAN's) such as the General Motors Manufacturing Automation Protocol (MAP) and other CAD/CAM interface topics could be of future interest. Subscription rate is approximately \$89.75 (U.S.). Free sample copy available on request.

Contact: Journal Information Center
Elsevier Science Publishers
52 Vanderbilt Avenue
New York, NY 10017, U.S.A.
Telephone: (212) 867-9040

- "Iron Age" - Published 24 times by Chilton Company, a division of American Broadcasting Companies, Inc. Contains frequent articles on CAD/CAM and Manufacturing Systems. Canadian subscriptions \$42 (U.S.).

Contact: Iron Age
Chilton Company
Chilton Way,
Radnor, PA 19089, U.S.A.

- "Canadian Machinery and Metalworking" - Published monthly by Maclean Hunter Limited.

Contact: Canadian Machinery and Metalworking
Maclean Hunter Limited
Maclean Hunter Building
777 Bay Street
Toronto, Ontario
M5W 1A7
Telephone: (416) 596-5714

- "Computers in Mechanical Engineering (CIME)" - Published bimonthly by the Computer Engineering Division of the American Society of Mechanical Engineers. Started in 1982, initially on a quarterly basis.

Contact: CIME
American Society of Mechanical Engineers
United Engineering Center
345 E 47 Street
New York, NY 10017, U.S.A.

- "Design Engineering" - Published monthly by Maclean Hunter Limited.

Contact: Maclean Hunter (as above)

- "Engineering with Computers" - A new international journal for computer-aided mechanical and structural engineering scheduled to begin publication January 1985. Subscription for volume 1 (4 issues) is \$74.00 (U.S.). Sample copy available on request.

Contact: D. Emin
Springer-Verlag New York, Inc.
175 Fifth Avenue
New York, NY 10010, U.S.A.

- "Mechanical Engineering" - Published monthly by the ASME.

Contact: American Society of Mechanical Engineers
United Engineering Center
345 E 47th Street
New York, NY 10017, U.S.A.

- "Modern Machine Shop" - A controlled circulation publication, free to qualified readers, or \$24 (U.S.) annually. Published monthly with two issues in January.

Contact: Gardner Publications, Inc.
6600 Clough Pike
Cincinnati, OH 45244, U.S.A.

- "Modern Materials Handling" - Published 18 times per year.

Contact: Modern Materials Handling
Cahners Publishing Co. Inc.
Div. of Reed Holdings
221 Columbus Ave.
Boston, MA 02116, U.S.A.
Telephone: (617) 536-7780

- "IEEE Journal of Robotics and Automation" - A new quarterly publication commencing in 1985. Available to IEEE members only, who are also members of an IEEE Society. Subscription \$10 (U.S.) for sponsoring society members and \$15 (U.S.) for members of other IEEE Societies.

Contact: IEEE Service Center
445 Hoes Lane
Piscataway, NJ 08854-4150, U.S.A.
Telephone: (201) 981-0060

- "Production Engineering" - (formerly Automation) Contains regular articles on Computer Integrated Manufacturing, robotics, flexible manufacturing systems in industry etc. Published monthly. Subscription \$55 (U.S.) in Canada.

Contact: Production Engineering
P.O. Box 95759
Cleveland, OH 44101, U.S.A.

- "Robotica" - An international journal on robotics technology, including sensory perception, software, CAD/CAM systems, control, kinematics and dynamics involved in robot design. Published quarterly beginning in 1983 under the guidance of an editorial board of robotics technology leaders in North America, United Kingdom, Europe, Japan and elsewhere. Subscription rate \$120 (U.S.) for institutions and \$50 (U.S.) for individuals. For author's manuscript information or subscriptions,

Contact: Cambridge University Press
32 East 57th Street
New York, NY 10022, U.S.A.

- "Robotics" - Quarterly publication from North-Holland with emphasis on international developments including market projections, and technology reviews. Applications cover manufacturing, including flexible manufacturing systems, as well as non-manufacturing areas. Volume 1, Number 1, May 1985. Subscription (4 issues) \$100 (U.S. approximately) plus \$8.40 (U.S.) postage.

Contact: Elsevier Science Publishing Co. Inc.
P.O. Box 1663
Grand Central Station
New York, NY 10163, U.S.A.

- "Robotics Engineering" - Published monthly. Contains many articles on industrial and non-industrial applications of robots in each issue. \$28 (U.S.) in Canada. Formerly called Robotics Age.

Contact: Robotics Engineering
Strand Building
174 Concord Street
Peterborough, NH 03458, U.S.A.

- "Robotics Today" - Published six times annually by Robotics International, a division of the Society of Manufacturing Engineers (RI/SME). Non-member subscription rates \$60 (U.S.). Membership rates available on request.

Contact: Robotics International
Society of Manufacturing Engineers
P.O. Box 930
Dearborn, MI 48121, U.S.A.

- "Robotics World" - Published monthly except July/August which are combined. Contains regular articles on robotics, flexible automation and intelligent machines \$31 (U.S.) in Canada.

Contact: Robotics World
6255 Barfield Road
Atlanta, GA 30328, U.S.A.

- "Technical Digest" - A quarterly publication of the Society of Manufacturing Engineers providing titles and abstracts of SME papers on CAD/CAM, Robotics, Manufacturing Systems, Management, Numerical Control and other topics.

Contact: Society of Manufacturing Engineers (as above)

- Publications of the SME and affiliates (see also above)

- "CIM Technology" - Formerly called "CAD/CAM Technology". Published quarterly by CASA/SME.

- "Manufacturing Engineering" - Published monthly by the SME.

- "Journal of Manufacturing Systems" - Published biannually by SME and CASE/SME.

- "Robotics Today" - Published bimonthly by RI/SME.

- "SME Newsletter" - Published quarterly by the SME.

- "SME Technical Digest" - Published quarterly by the SME. Contains abstracts for all new SME Technical Papers. In addition the SME publishes many conference proceedings and books such as those in its Manufacturing Data Series.

Contact: Society of Manufacturing Engineers (SME)
One SME Drive, P.O. Box 930
Dearborn, MI 48121, U.S.A.
Telephone: (313) 271-0777

- CAD/CAM Newsletters

Reproduced from the January 1985 newsletter plus updates where new information has been received, or deletions where verification was not readily possible.

- "Advanced Manufacturing Technology" (formerly Industrial Robots International) - A twice monthly report of industry news and events. Annual subscription \$317 (U.S.).

Contact: Technical Insights, Inc.
32 N Dean St.
Engelwood, NJ 07631, U.S.A.

- "A-E-C Automation Newsletter" - A subscription newsletter analyzing and reporting developments in automation for architects, engineers and constructors. Subscription for 12 issues per year \$96 (U.S.) by first class mail in U.S.A., Canada and Mexico.

Contact: A-E-C Automation Newsletter
7209 Wisteria Way
Carlsbad, CA 92008, U.S.A.
Telephone: (619) 438-1595

- "The Anderson Report" - A monthly newsletter on computer graphics describing industry events, company announcements, new developments etc. including the "Inside Report" which summarizes and evaluates company and product offerings. Annual subscription U.S. and Canada \$187 (U.S.).

Contact: Anderson Publishing Company
4525 E. Industrial St., Suite 4L
Simi Valley, CA 93063, U.S.A.

- "Automation Microfiche Package" - A new subscription service available from NTIS. Provides complete copies in microfiche form of current reports dealing with automation and computer technology for productivity improvement and manufacturing activities. Issued every two weeks. Approximately 110 reports per year.

Contact: Selected Research in Microfiche (SRIM)
National Technical Information Service (NTIS)
U.S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161, U.S.A.
Telephone: (703) 487-4640

- "CAD/CIM Alert" (formerly CAD/CAM Alert) - A state-of-the-art monthly news and information publication, guided by an extensive editorial board. Subscription \$232 (U.S.) per year.

Contact: The Management Roundtable, Inc.
822 Boylston Street
Chestnut Hill, MA 02167, U.S.A.
Telephone: (617) 232-8080

- "CAD/CAM Digest" - A bimonthly publication with information on user applications, new product announcements and conference listings. Subscription \$40 (U.S.) in U.S.A. and Canada including postage.

Contact: CAD/CAM Publications Ltd.
170 Park Road
Peterborough, England PE1 2UF

- "CAD/CAM Management Strategies" - a 300 page looseleaf reference publication that is updated monthly with information on industry trends, costs, benefits analysis and strategic planning information on CAD/CAM \$125 (U.S.).

Contact: Auerbach Publishers, Inc.
6560 North Park Drive
Pennsauken, NJ 08109, U.S.A.
Telephone: (609) 662-2070

- "CAD/CAM Newsletter" - A monthly newsletter initiated in 1979 by the CAD/CAM Technology Advancement Council. Includes CAD/CAM abstracts selected from world literature plus information and conference listings. Available on request.

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

- "Computer Aided Design and Manufacture" - A monthly newsletter describing new systems available, systems applications, research and development, events, courses and meetings under the guidance of an international advisory board. Subscription £110 in U.K.

Contact: Oyez Scientific and Technical Services Ltd.
Bath House
56 Holborn Viaduct
London, EC1A 2EX, England

- CICS Bulletin - Newsletter issued approximately four times per year to members of the Canadian Industrial Computer Society. Contains short technical reviews, notices, etc. concerning industrial computer systems, which includes sensor based process control systems, CAD/CAM and other application areas.

Contact: CICS Secretariat
12 Kindle Court
Ottawa, Ontario
K1J 6E2

- "Flexible Automation - The Newsletter of Automated Systems" - "Flexible Automation" is a monthly newsletter that covers programmable production and assembly equipment plus the hardware and software that ties them together. Typical issues contain approximately eight pages of industry news on developments in flexible automation systems, CAD/CAM, robotics plus publications available, seminars and workshops. Subscription \$144 (U.S.) annually.

Contact: Flexible Automation
P.O. Box 175
Ho-Ho-Kus, NJ 07423, U.S.A.
Telephone: (201) 652-4464

- GATEWAY - The MAP Reporter - Volume 1, number 1 of this publication, designed to keep interested persons up-to-date on the Manufacturing Automation Protocol (MAP), is dated January - February, 1985.

Subscription rates for six bimonthly GATEWAY newsletter issues, twelve monthly GATEWAY calendars and GATEWAY special issues are \$245 (U.S.) per year.

Contact: GATEWAY
Industrial Technology Institute
P.O. Box 1485
Ann Arbor, MI 48106, U.S.A.
Telephone: (313) 763-9273

- "Manufacturing Productivity Frontiers" - A monthly publication, typically of 50-60 pages, containing feature articles, reviews and previews of meetings such as CAD/CAM and robotics conferences, short articles, book and journal reviews, abstracts of current literature and a meeting's calendar. Annual subscription rate to points outside the U.S.A. is \$150 (U.S.) for the first subscription and \$100 (U.S.) for each additional subscription to the same address.

Contact: Manufacturing Productivity Frontiers
Manufacturing Productivity Center
IIT Center, 10 West 35th Street
Chicago, IL 60616, U.S.A.
Telephone: (312) 567-4808

- "Robots" - Le Journal de la Robotique Industrielle et de la Productique. Published eleven times annually in French with news emphasizing European developments. Annual subscription (foreign) 850 F. Published in collaboration with CESTA (Centre d'Études des Systèmes et des Technologies Avancées).

Contact: Robots
Charles M. Coën
47 bis, rue du Rocher
78008 Paris, France

- "Robot News International" - Published monthly. Contains news of company and robot industry developments. Annual subscription £115 including air mail postage.

Contact: Industrial Newsletters and IFS (Publications) Ltd.
35-39 High Street
Kempston, Bedford MK427BT
England

- "Robotics Report" - A monthly report of industry news and events. Annual subscription \$137.50 (U.S.).

Contact: Washington Capital News Reports, Inc.
7043 Wimsatt Road
Springfield, VA 22151-4070, U.S.A.

- "SIGDA Newsletter" - Published quarterly by the Association for Computing Machinery (ACM), Special Interest Group on Design Automation (SIGDA).

Contact: Association for Computing Machinery
11 West 42nd Street
New York, NY 10036, U.S.A.

- "S. Klein Newsletter on Computer Graphics" - A twice monthly newsletter continuing from the previous Harvard Newsletter on Computer Graphics. Annual subscription \$223 (U.S.).

Contact: The S. Klein Newsletter on Computer Graphics
c/o Technology & Business Communications Inc.
730 Boston Post Road
Subscription Department, P.O. Box 915
Sudbury, MA 01776, U.S.A.

- CAD/CAM Directories and Product Guides

The following items are based on the most recent information available to the newsletter editor. New directories are appearing regularly, hence this is only a partial listing. Most companies and organizations could probably save themselves considerable time and expense by ensuring that they have at least two or three of these publications readily available.

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

This publication provides an index and guide for managers and technical personnel in industry to the 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. 380 pp. Available in French or English. Price \$10 pre-paid.

Contact: NRC Publications
National Research Council of Canada
Ottawa, Ontario
K1A 0R6

- CAD/CAM Products and Services in Canada - A directory of companies and organizations providing CAD/CAM products and services in Canada. Information compiled in 1981, 50 pp. Available in French or English. No charge. An updated third edition is in preparation and planned to be available soon.

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

- "1985 CADD Systems Survey" - The fifth annual directory to suppliers of Computer Aided Design and Drafting Systems (CADD) has been prepared by Canadian consultant R. Charlwood and published in Canadian Consulting Engineer, December 1985 (pp. 17-31, 34-39, 41-42, 44, 46-7). Approximately 47 systems suppliers are listed with system hardware and software features, application areas, price range, principal address of the supplier and indication of the suppliers technical and sales support locations in other cities across Canada. A separate tabulation lists approximately 19 suppliers for CADD on a systems software or service basis.

Systems are now available in a continuous price range from under \$10,000 (using personal computers) to those with complete engineering and drafting capabilities in the \$150-\$2000,000 range and up. Reprints of the 1985 CADD Systems Survey for \$3.

Contact: Canadian Consulting Engineer
1450 Don Mills Rd.
Don Mills, Ontario
M3B 2X7
Telephone: (416) 445-6641

- Mini Directory - The Canadian publication "CAD/CAM and Robotics" regularly publishes a mini-directory of CAD/CAM suppliers, CAD/CAM educational centres, etc.

Contact: CAD/CAM and Robotics
Kerrwil Publications Limited
501 Oakdale Road
Downsview, Ontario
M3N 1W7
Telephone: (416) 746-7360

- "An Index & Guide to Robotics Research & Development in Canada" - This report, prepared for international as well as Canadian distribution, provides a reference guide for managers and technical personnel in industry and research institutions who have a need to know where robotics R&D is being undertaken in Canada plus a description of the directions and level of the effort. The report, prepared for NRC by robotics researchers and specialists at the University of Toronto and the Ontario Robotics Centre is available in English or French. Publication Number NRCC 24470 (English) or 24471 (French).

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

- Annual NC Census - The publication "Canadian Machinery and Metalworking" publishes an annual survey of NC machine tool installations in Canada, normally in their March issue. The survey lists user installations by company and location plus the make and model of equipment used. The survey was expanded in 1983 to include CAD/CAM, Robotics, and Flexible Manufacturing Systems.

Contact: Canadian Machinery and Metalworking
Maclean-Hunter Publishing Company
777 Bay Street
Toronto, Ontario
M5W 1A7

- "Robotics, CAD/CAM Market Place 1985" - A 239 page index to books, conferences, journals, associations, educational institutes, robot manufacturers, consultants and others. For example over 1300 currently available books and over 500 U.S., Canadian and International Journals are listed.

Contact: R.R. Bowker Company (A Xerox Information Company)
205 East Forty Second St.
New York, NY 10017, U.S.A.

- "CAD International Directory 1986" - A 303 page index to CAD software, workstations, display devices, plotters, turnkey systems, consultants, etc.

Contact: Butterworth Scientific Ltd.
P.O. Box 63
Westbury House
Bury Street
Guildford, Surrey, England
GV2 5BH

- "CAD/CAM Industry Directory" - A 160 page directory of suppliers and products for CAD, CAM, NC, Programmable controllers etc. which is Volume II of the Intelligent Factory Series. Volume I is the Robotics Industry Directory and Volume III is the Industrial Sensor Directory. Each Volume \$35 (U.S.).

Contact: Technical Data Base Corp.
P.O. Box 720
Conroe, TX 77305, U.S.A.

- "CAD/CAM Productivity Equipment Series" - A 785 page soft cover index to manufacturers' products giving manufacturer, address, product description, photographs, product features, etc. Covers Computer-Aided Design and Drafting Systems, CAD/CAM Systems, Graphics Systems, NC Tape Preparation Systems, Plotters, Digitizers, etc. Order Code #782. SME members \$41 (U.S.). Non-members \$46 (U.S.).

Contact: Publication Sales
Society of Manufacturing Engineers
One SME Drive, P.O. Box 930
Dearborn, MI 48121, U.S.A.

- "The PC Software and Systems Directory for Computer-Aided Engineering" - A Directory of products and applications for Computer Aided Engineering implemented on personal computers. Lists 40 applications on 25 types of PC. \$99 (U.S.). Published January 1985.

Contact: CAD/CAM ALERT
The Management Roundtable, Inc.
824 Boylston Street
Chestnut Hill, MA 02167, U.S.A.
Telephone: (617) 232-8080

- "The S. Klein Directory of Computer Graphics Suppliers" - The 1984-85 edition of this reference publication describing vendor systems; component hardware, software, turnkey and time-shared systems is available, 224 pp., \$60 (U.S.), postage included. Includes a directory of Computer Graphics market research reports.

Contact: S. Klein Directory of Computer Graphic Suppliers
730 Boston Post Road, Suite 27
Sudbury, MA 01776, U.S.A.
Telephone: (617) 443-4671

- "Factory of the Future" - Report No. E82 - A market study and forecast report with statistics from 1967 to 1982 for factory automation including machine tools and controls, manufacturing computers, CAD/CAM systems and robots plus projections for the period 1982-87 and 1987-95. Spending for factory automation, which accounted for .56 of GNP in 1967 had reduced to .24% by 1982, with total sales in 1982 less than \$7.5 billion. Total sales should reach nearly \$15 billion by 1987 and growth rate of 15%. The market for CAD/CAM design and drafting, systems has reached \$1 billion annual sales with 25% annual growth projected to 1987. Annual growth rate for programmable controllers of 31% is forecast with sales progressing from \$213 million in 1982 to \$830 million in 1987. The robotics market is reported to have reached \$190 million by 1982 with a 36% annual increase projected until 1987 when sales will approach \$1 billion. Machine tools and controls at \$4 billion equipment sales represented 53% of the total \$7.5 billion market in 1982. Cost of the report is \$1400 (U.S.).

Contact: Predicasts Inc.
11001 Cedar Avenue
Cleveland, OH 44106, U.S.A.
Telephone: (800) 321-6388

- "CAD/CAM, CAE: Survey, Review and Buyer's Guide" - A bi-monthly report which typically provides an in-depth examination of 133 vendors offering 236 systems. In 1985 partial year reports showed that industry growth had slowed to an estimated 24%, down from 30% growth in 1984, with IBM and Intergraph continuing growth while other industry leaders, such as Computervision, Calma and Applicon, reported to have reduced sales in 1985. Strong growth is expected in PC based systems which can frequently yield 70% of the benefits for 20% of the cost.

Contact: Daratech Inc.
16 Myrtle Avenue
P.O. Box 410
Cambridge, MA 02238, U.S.A.
Telephone: (617) 354-2339

- Guide to Robotics Literature - A new guide to current robotics literature is available, without charge, from the Robotic Industries Association (RIA). Known as the RIA Publications Catalog, the guide provides descriptions, photos, and ordering information for ten titles of interest to those in the robotics field.

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

- "Industrial Robots" - An addition (January 1983) to the SME Productivity Equipment series. A 400 page compilation of specifications and drawings from over 60 manufacturers. Includes sections on accessories, control systems, vision systems and consultants, \$31 (U.S.), for SME members \$36 (U.S.) for non-members, plus \$1.25 (U.S.) for postage and handling.

Contact: Publication Sales
Society of Manufacturing Engineers
One SME Drive, P.O. Box 930
Dearborn, MI 48121, U.S.A.

- "The International Robotics Industry Directory" - Edited by P.C. Flora, 1984, 386 pages. Includes comparison and detailed data on models, specifications, price, warranty, etc. from robot manufacturers plus robot components, peripherals and a list of consultants. Price approximately \$60 (U.S.).

Contact: Technical Data Base Corporation
P.O. Box 720
Conroe, TX 77305, U.S.A.

- "Machine Vision Systems" - An introduction to machine vision systems providing a balance of both technical descriptions and business trends. Chapters 1-3 describe machine vision systems. Chapter 4 describes the machine vision industry, with information on both users and suppliers. Chapter 5 provides a future outlook and market trends. 217 pp.

Contact: Tech Tran Consultants, Inc.
P.O. Box 206
Lake Geneva, WI 53147
Telephone: (414) 248-9510

- "1986 NC/CAM Guidebook" - A 572 page volume containing fourteen chapters on the fundamentals of NC, CAD/CAM, CIM etc. plus a directory of suppliers \$10 (U.S.).

Contact: Modern Machine Shop NC/CAM Guidebook
6600 Clough Pike
Cincinnati, OH 45244-4090, U.S.A.
Telephone: (513) 231-8020

- "The World Yearbook of Robotics R&D" - A comprehensive compendium describing research and development activities underway in academic and industrial research establishments worldwide. For information on availability, or to submit entries (for which there is no charge) contact the following. The 2nd edition, for which information has already been collected, is scheduled for publication April 1986.

Contact: Elizabeth Horsley, Information Editor
Kogan Page Ltd.
120 Pentonville Road
London N19 JN
England

- "Machine Intelligence" - A new bibliography on contact and noncontact sensors is now available from IFS (Publications) Ltd. and Springer-Verlag. Entitled Machine Intelligence, the 240 page book contains approximately 1400 references with abstracts.

The book documents international R&D efforts in the research and production arenas over the past 10 years. Selections were made from major conferences and journals. Applications of sensors in the aerospace, automotive, electronics, steel, nuclear, and manufacturing industries are discussed. Applications in such process areas as assembly, inspection, production engineering, welding and fabrication and finishing are also reviewed.

Contact: IFS (Publications) Ltd.
35-39 High Street
Kempston, Bedford, England MK42 7BT
Telephone: (0234) 853-605
Telex: 825-489

or

Springer-Verlag New York Inc.
P.O. Box 2485
Secaucus, NJ 07094, U.S.A.

- "Strategic Report on CAD/CAM Software" - R. Simon. Provides reviews and approvals of the CAD/CAM software from the major suppliers. Prepublication price \$495 (U.S.). \$595 (U.S.) after publication in early 1986.

Other reports available include:

- "The Solid Modeling Revolution" \$240 (U.S.)
- "The Complete Guide to Solid Modelling" \$495 (U.S.)
- "CAD/CAM Standards: Is IGES the Answer" \$425 (U.S.)
- "CAD/CAM Data Bases: Gaining Control" \$295 (U.S.)
- "PC CADD: A Buyer's Guide" \$170 (U.S.)

Contact: Management Roundtable, Inc.
824 Bolyston Street
Chestnut Hill, MA 02167, U.S.A.
Telephone: (617) 232-8080

- "Solid Modeling: A State-of-the-Art Report" - An in-depth comparison and benchmarking of currently available solids modeling systems authored by Bob Johnson, 270 pp., \$395 (U.S.). See also CAD/CAM Alert, November 1984 for a tabular comparison of the strengths and weaknesses of many systems, including McAuto (UNISOLIDS), Applicon (SOLIDS MODELING II), MAGI (Synthavision), Matra Datavision (EUCLID), Prime Computer (MEDUSA) and others. Information is based on a new, additional, report in preparation.

Contact: CAD/CAM ALERT
The Management Roundtable, Inc.
824 Boylston Street
Chestnut Hill, MA 02167, U.S.A.
Telephone: (617) 232-8080

- "Automated Guided Vehicle Systems" - A 111 page report published in 1983 by Technical Insights in cooperation with the SEAI Institute in Georgia. Automated Guided Vehicle Systems (AGVS) are now being used in production line functions and flexible manufacturing systems as well as automated warehousing. Twenty-five manufacturers are listed with addresses and telephone numbers in the U.S.A. Price \$85 (U.S.).

Contact: Technical Insights
P.O. Box 1304
Fort Lee, NJ 07024, U.S.A.

- Bibliographies

- "Robotics Bibliography: 1981-1982 Part (A) Applications of Industrial Robots" - N.N. Abdelmalek - A 155 page bibliography on the application of industrial robots covering references which became available between 1981 and June 1983. Abstracts are provided in many instances for the references cited. This report is an update to the earlier report "Robotics Bibliography 1970-1980 Part (A) Applications of Industrial Robots" NRC report number ERB-935, 1981.

Entries in the new 1981-82 bibliography NRC report ERB-959, August 1983 are classified and listed under twelve application areas: 1 - Metal working, 2 - Metal welding, 3 - Metal casting and foundry operations, 4 - Painting, surface finishing, heat treatment, 5 - Loading tools, work pieces, NC lathes, machines, 6 - Materials handling, 7 - Assembly operation, 8 - Space, underwater, mining operations, 9 - Industrial inspection, safety measures, 10 - Medical and biomedical applications, 11 - Miscellaneous, 12 - Games, skills, sport, home, etc. Both reports 935 and 959 are currently available without charge.

Contact: Editorial Office, Room 301
Division of Electrical Engineering
National Research Council of Canada
Ottawa, Ontario, Canada
K1A 0R8

- "A Commented and Indexed Bibliography on Data Structuring and Data Management in CAD/CAM: 1970 to mid - 1983" - F.B. Vernadat, March 1984
- A 251 page tutorial and bibliography on data structuring and data management in CAD/CAM, including computer graphics and factory automation. A strong emphasis is placed on data base requirements, methodologies and possible system architectures. 909 references. Publication number ERB 956, NRCC 23373.

Contact: Editorial Office
Division of Electrical Engineering
National Research Council of Canada
Ottawa, Ontario, Canada
K1A 0R8

- "Towards the Factory of the Future - An Index & Guide to CAD/CAM Technology" - J.H.C. Scrimgeour - Presents approximately 1300 references with abstracts, covering all aspects of computer integrated manufacturing, which have previously appeared in the monthly CAD/CAM Newsletter from August 1979 to December 1984. The material, which may be used for tutorial or reference use, as well as curriculum structuring etc., is organized under subject headings 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.

Contact: Division of Electrical Engineering
Building M-16
National Research Council of Canada
Ottawa, Ontario
K1A 0R6
Telephone: (613) 993-9000

- "Robotics Technology Abstracts" - A monthly publication entitled "Robotics Technology Abstracts", produced by Britain's Cranfield Institute of Technology, now available in North America from Tech Tran Corp. Provides summaries of important robotics information contained in technical and professional journals, trade publications, business magazines, conference proceedings, new product announcements, and special reports. The information comes from worldwide sources and, in many cases, the original documents have not been translated into English.

Contact: Tech Tran Corp.
134 North Washington Street
Naperville, IL 60540, U.S.A.
Telephone: (312) 369-9232

- "SME Bibliographic Data Searches" - The Society of Manufacturing Engineers has available a number of bibliographic data searches of information published over the past ten years. Most contain approximately one hundred references.
 - Computer Automated Process Planning" - Report # Me-85-880086
 - "CAD/CAM in the Automotive and Aerospace Industries" - Report # ME-85-880110
 - Machining Centres" - Report # ME-85-880128
 - "Automation in the Finishing Industry" - Report # ME-85-880102
 - "Jigs and Fixtures" - Report # ME-85-880029
 - "Manufacturing Data Bases" - Report # ME-85-880037
 - "Group Technology" - Report # ME-85-880052
 - "Computers in Assembly" - Report # ME-85-880060
 - "Gaging" - Report # ME-85-880078
 - "Flexible Manufacturing Systems" - Report # ME-85-880219
 - "Annealing and Heat Treating" - Report # ME-85-880193
 - "Die Design" - Report # ME-85-880235

The above information is provided courtesy of Manufacturing Productivity Frontiers. For further information on each of the above, contact:

Society of Manufacturing Engineers
One SME Drive, P.O. Box 930
Dearborn, MI 48121, U.S.A.

- "SME Technical Digest" - The Technical Digest is a quarterly guide to new Technical Papers published by SME.

The Digest is produced directly from the SME INTIME Manufacturing Databank—providing titles, authors, number of pages, and concise abstracts of current papers. The information is divided into sections for quick reference: Assembly, Finishing, Manufacturing Systems, Material Removal, and more.

Each year the fourth quarter provides a special Cumulative Edition, containing a convenient "entire year" reference. This volume contains a compilation of the first three quarters, plus the fourth quarter, plus additional special features.

SME members may obtain this publication for \$22 (U.S.) in addition to their current dues and publications billing.

Contact: SME (as above)

5. CAD/CAM Information Available

- "An Ontario Market Profile: Flexible Automation Equipment"

This report of approximately ninety pages, including appendices, studies in detail the growth and current use of flexible automation equipment, primarily numerically controlled machine tools and industrial robots. Statistics for Canada as a whole are given in many instances, in addition to Ontario, which accounts for approximately 61% of all NC tools in Canada. The total number of installed NC machine tools in Canada reached 3457 in 1984, but represented a much lower percentage of NC usage than in other countries such as the U.K., U.S.A., and Japan by factors of 2 to almost 10. The source of Canadian NC tools has changed dramatically since 1974, when Japan's market share was close to zero, rising to about 40% since 1981. The number of installed robots reached 1032 as of September 1985, with 70% in the auto/auto parts sectors as compared to about 6% in that sector for NC. Barriers to automation for NC are identified as; (1) insufficient operator training (2) inadequate management awareness (3) financial constraints. For industrial robots they are identified as; (1) management inexperience with flexible automation and its benefits (2) lack of systems expertise (3) financial constraints (which is partly an inability to properly appraise investments in robots). While growth in the use of flexible automation has been steady and progressive, its use is still regarded as being in its infancy in Canada.

Contact: Ministry of Industry, Trade and Technology
Innovation and Technology Division
900 Bay St., Hearst Block
Toronto, Ontario
M7A 2E1
Telephone: (416) 963-1373

6. CAD/CAM Conferences, Seminars, etc. (See also January listings for 1986.)

- "AIM-TECH 86-A New Beginning"

May 4-7, 1986, Radisson South Hotel, Minneapolis

The 23rd Annual General Meeting of AIM-TECH (formerly the Numerical Control Society) will be held as above. Parallel sessions for technical papers will focus on NC, communications, CAD/CAM, and interfacing. The entire first day will be devoted to interfacing sessions and MAP (Manufacturing Automation Protocol).

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

- "Graphics Interface '86" and "Vision Interface '86"

May 26 - May 30, University of British Columbia, Vancouver, B.C.

Computer Graphics and Computer Vision will be the themes of two companion conferences to be held simultaneously in Vancouver, British Columbia, Canada from Monday, May 26 to Friday, May 30, 1986. The joint conferences provide two days of tutorials (May 26 and May 27) and three days of technical sessions (May 28-30). The technical sessions will feature 40 papers on Computer Graphics and 28 papers on Computer Vision. The topics of the Graphics Interface technical sessions include: Animation, Algorithms, Applications, Computer Graphics and AI, Display Algorithms, Hardware, Human Animation, Modelling, and User Interfaces. The session topics for Vision Interface are: Image Processing and Pattern Recognition, Perception/Computational Vision, Remote Sensing and Geo-Information, Robotics, Vision/Graphics Interface and Applications.

Registration for the full three conference days is \$250 for members and \$300 for non-members. A block of accommodation has been reserved at U.B.C. where the joint conferences are being held. Early registration is advised in view of Expo '86.

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

- "APMS '87 - Third International Conference on Advances in Production Management Systems"

August 11-14, 1987, Holiday Inn (Downtown) Winnipeg, Manitoba

The third international conference in this series, sponsored by IFIP WG 5.7 (International Federation of Information Processing Working Group 5.7) will be held in Winnipeg in 1987. First announcement and call for papers have been issued, with extended abstracts due March 31, 1986. Topics planned include modelling, analysis and simulation of production systems, scheduling, process planning, economic justification of FMS, CAD and Production Management, etc.

Contact: Dr. Andrew Kusiak, Conference Chairman
Dept. of Mechanical & Industrial Engineering
University of Manitoba
Winnipeg, Manitoba
R3T 2N2 Canada
Telephone: (204) 474-9839
Telex: 07-587721

7. CAD/CAM Quotes

- "In manufacturing, it is the flow of information that structures the operation of a modern factory. The drive towards total automation through robotics and computer-integration is critically dependent on the

development of manufacturing automation protocols to control the flow of that information."

Brian R. Gaines "The Entrepreneur in the Information Age"
University of Calgary, October 3, 1985.

- "Because the CIM investment decision is usually a strategic investment that a company makes to gain a competitive advantage, it should be evaluated in its entirety. The company should forecast and discount all of the differential cash outflows and inflows associated with the strategy, not just the cash flows associated with the cost-saving component of the investment."

A.H. Seed, Arthur D. Little, Inc., "Justifying the Cost of CIM"
Manufacturing Productivity Frontiers, November 1985.

- "The key to long-term success--even survival--in business is what it has always been: to invest, to innovate, to lead, to create value where none existed before. Such determination, such striving to excel requires leaders--not just controllers, market analysts and portfolio. In our preoccupation with the braking systems and exterior trim (i.e., return on investment), we have neglected the drive trains of our corporations."

"Managing our Way to Economic Decline", Hayes & Abernathy, Harvard Business Review, July-August 1980.

- "The use of Flexible Automation is still in its infancy in Canada."

Report "An Ontario Market Profile, Flexible Automation Equipment"
Ontario Ministry of Industry, Trade and Technology, November 1985.

8. This newsletter may be reproduced in whole or in part. Reprinting in other Canadian publications is encouraged. Acknowledgement to the Canadian CAD/CAM Council would be appreciated.

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Please note that requests for additions, deletions or changes to the newsletter distribution list should normally be directed to the secretariat.

