



# CAD/CAM



October 1986

Information Compiled by the Canadian CAD/CAM Council

for the Advancement of Computer Integrated Manufacturing \*

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### 1. Standard Glossary of Industrial Automation Terms

Following the September 11-12 meeting of its technical committee 184 SC5 in London, England, the International Standards Organization (ISO) has set in place the project mechanism to establish an international standard glossary of industrial automation terms. Co-convenors for the project are Mr. A. Roca of France and J. Scrimgeour of the National Research Council, Canada.

Steps are now being taken to build a data base of terms and definitions based on known and existing glossaries, hopefully by March 1987 at which time initial distribution within the ISO TC 184 SC5 will commence for comment and further consideration. The work of building the glossary in data base form, hopefully by means of OCR input, is being handled by Mr. J. Buckley of the NRC Division of Mechanical Engineering.

Readers of the CAD/CAM Newsletter who have, or know of, existing glossaries which should be considered for input material are requested to contact the newsletter editor. Hard copy of the existing glossaries would be appreciated in instances where these are reasonably short, out of print or difficult to obtain.

Contact: J. Scrimgeour  
ISO Industrial Automation Glossary  
Room 382, Bldg. M-50  
Division of Electrical Engineering  
National Research Council  
Ottawa, Ontario, Canada  
K1A 0R6

## 2. Canadian MAP Interest Group (CMIG)

The CAD/CAM Newsletter has frequently carried items concerning the Manufacturing Automation Protocol (MAP) originally proposed by General Motors. Development is now guided by a multi-industry group supported by the Society of Manufacturing Engineers (SME). MAP is seen as a widely - supported, non-proprietary solution to data communications in the modern automated factory.

Following are items of interest extracted from the editor's files as a member of the MAP Users Group of the SME and the Canadian MAP Interest Group (CMIG).

- In addition to the Manufacturing Automation Protocol (MAP) for factory environment data communications, another information network, called the Technical and Office Protocol (TOP) exists in somewhat parallel form. Essentially TOP is the technical/office counterpart to MAP which is for factory automation. The TOP suite of Open Systems Interconnection (OSI) protocols was created under the guidance of Boeing Computer Services (BCS) of Seattle, Washington.
- To improve both factory and office computer communications, the MAP and TOP users groups have been combined into one organization called the MAP/TOP Users Group. This will eliminate duplication of effort and improve development of the protocols. The SME is providing secretariat and administrative support for the combined group.
- Secretariat services for the Canadian MAP Interest Group are provided by Mr. R. Haighton of the Canadian Standards Association in Rexdale, Ontario who volunteered to do so at an early organization meeting of the CMIG in 1985.
- As of May 1986, the CMIG had over 150 members in the following categories

Corporate members	28
Associate members	12
Individual members	<u>113</u>
Total	153
- Members of the CMIG automatically receive the newsletter of the CMIG and also the quarterly publication "MAP/TOP Interface" from the SME.
- The Industrial Technology Institute in Ann Arbor, Michigan and the SME are jointly producing a MAP/TOP Product Directory of vendor and product development. Subscriptions for SME members are \$115 (U.S.) for two issues annually. The Ontario CAD/CAM Centre now subscribes to the ITI AMTech on-line service and is prepared to answer requests from CMIG members for information from the MAP/TOP Directory at no charge for routine requests. Contact Anna Larson, Information Services Supervision (519) 622-3100.

- A survey of Canadian firms with MAP products and services is being undertaken as of May 1986. Organizations wishing to be listed should contact Rob Porter of the Ontario Centre for Advanced Manufacturing (OCAM) at (416) 675-4367.
- A European MAP Users Group (EMUG) has been formed. The Japanese MAP Users Group now has over 500 members.
- The second meeting of the International Federation of MAP Users was held recently in Paris. R. Haighton attended on behalf of the CMIG.
- The MAP specification version MAP 2.1 is available from the secretariat of the CMIG at the following costs:

Corporate members - Free by mail  
Associate members - \$10  
Individual members - \$20  
Non-members - \$28

- The publication "GATEWAY: The MAP Reporter" is highly recommended. For a sample copy or subscription information,

Contact: Editor  
GATEWAY: The MAP Reporter  
Industrial Technology Institute  
P.O. Box 1485  
Ann Arbor, MI 48106, U.S.A.  
Telephone: (313) 769-4109

- An original goal proposed for transaction times with MAP was "a few milliseconds" in order to provide real-time searching, particularly in process industry applications. However, MAP is a seven layer protocol. The six layers used in MAP 2.1 operate independently and each therefore contributes to the total message delay time. Analysis shows that a one-second round trip transaction time is realistic via MAP 2.1. Details, which depend on the number of nodes, addresses and file handling, are given in an analysis by R. Crowder, President and Consultant, Ship Star Associates, Inc. in the August 1986 issue of MAP/TOP Interface. Bypassing of all unnecessary protocol layers is suggested as a means to enhance performance.
- The annual general meeting of the CMIG was held at the Skyline Hotel in Toronto, September 22, 1986.

For information concerning the CMIG, contact:

R. Haighton, Secretary CMIG  
Canadian Standards Association  
178 Rexdale Boulevard  
Rexdale, Ontario  
M9W 1R3  
Telephone: (416) 747-4017

- For information on MAP products or the MAP/TOP Users Group, contact:

MAP/TOP Users Group  
Society of Manufacturing Engineers  
One SME Drive  
P.O. Box 930  
Dearborn, MI 48121, U.S.A.  
Telephone: (313) 271-1500 ext. 521

- For information on MAP video tapes, contact:

Audio Visual  
General Motors Photographic  
465 West Milwaukee Avenue  
Detroit, MI 48202, U.S.A.  
Telephone: (313) 556-1419

### 3. OCAM's Annual Report

The Ontario Centre for Advanced Manufacturing (OCAM), was established in 1983. As an Ontario Crown Corporation it offers its clients assistance and technical support in the practical application of CAD/CAM/CAE/CIM and factory automation technologies on a fee-for-service basis. OCAM employs almost 100 professional and support staff with technology application centres in Cambridge, Peterborough and Windsor, Ontario.

The wide variety of support programs includes in-plant opportunity studies, cost-benefit estimates, implementation plans, customized in-plant training assistance plus frequent seminars and workshops.

The OCAM annual report indicates solid growth for the 1985/86 fiscal year ending March 31. Contracts were signed with more than 450 Ontario firms, double the previous year. Over one-third of contracts were with small companies of less than 100 employees. Revenue generated was up 42% to a total of over \$3 million for the year.

### 4. Book Reviews

"The World Yearbook of Robotics Research and Development", 2nd edition, Kogan Page Ltd. (London, England) 1986, 583 pp. hard cover, £47.50 in the U.K. Canadian and U.S.A. distributor, Gale Research Company, Detroit, Michigan.

The second edition of this authoritative publication contains comprehensive reviews of robotics research and development in all the principal countries of the world.

Part one of the publication contains overview perspectives written by authorities in the U.S.A., France, the U.K. and Japan. Interestingly, the perspective on robotics R&D in Japan is provided by a Canadian,

M.P. Turchan, then at the University of Tokyo, and now with Bell Northern Research in Ottawa. As a small point, the well known International Conference on Advanced Robotics (ICAR), held in Tokyo in 1985, is credited as an activity of the Joint Coordinating Forum on International Cooperation in Advanced Robotics (JCF/ARP), a program in which Canada is a participating country. Although the 1983 ICAR coincided with the first meeting of the JCF/ARP in Tokyo, the two are actually separate activities. This small point, however, does not detract from Mr. Turchan's excellent coverage of robotics R&D in Japan, and an amalgamation of the ICAR and JCF/ARP might, in fact, be a good idea.

The second part of the book provides overviews, such as national funding programs, in various countries, including Canada, while the third part provides details of robotics R&D activities at specific university, government and industrial laboratories on a country by country basis, Canada again included. Addresses, personnel listings and phone numbers are given for each centre, adding to the potential usefulness of the book. The information on Canadian R&D in sections two and three is particularly complete, amounting to 42 pages in total, by virtue of the National Research Council Publication No. 24470 from which much of the information was extracted. This compares favourably with the descriptions for the USA (approx. 86 pp.), the U.K. (approx. 84 pp.) and Japan (approx. 31 pp.).

The remaining sections four, five, six and seven of the publication contain indexes and reference information relative to centers, an index of researchers by name and affiliation, subject indexes and other matter. All in all, a highly useful publication, particularly as a desk reference. Information for the third edition is already being collected by the publisher.

Reviewed by J. Scrimgeour, Senior Advisor, CAD/CAM, Robotics and Industrial Automation, Division of Electrical Engineering, National Research Council. Mr. Scrimgeour has twenty three years experience in engineering design and development, computer aided engineering, process computer control systems, CAD/CAM and industrial automation in industry and fifteen years experience as a senior staff advisor in government.

##### 5. CAD/CAM Information Available

- "Managing Automation", Vol. 1, No. 1, May 1986.

Inspection of the first issue of this new monthly publication indicates that it can be highly recommended, particularly for identifying and presenting the management issues associated with automation. As the publication's sub-title indicates, it intends to be "the management magazine of computer integrated manufacturing" and they are off to a good start.

Available to qualified readers in the U.S.A. without charge, the subscription cost in all other countries is \$65 (U.S.) per year.

Contact: Managing Automation  
Thomas Publishing Company  
One Penn Plaza  
New York, N.Y. 10119, U.S.A.

- "CAD/CAM Activities at NRC", Publication No. 25719, March 1986.

This informal 24 page publication prepared by a group of National Research Council employees identified as the NRC CAD/CAM Interest Group outlines their various on-going projects. More than 50 persons are involved in the various projects which include the Division of Mechanical Engineering, Division of Electrical Engineering, the former Division of Building Research (now called the Institute for Research in Construction), Industrial Materials Research Institute, Institute for Marine Dynamics, the National Aeronautical Establishment and others.

Projects described include a standard CADD benchmark, CADD standards for construction industry drawings, sensory based robotics, advanced techniques in computer graphics, the interfacing of a 3D vision sensor as input to a CAD/CAM system solids model data base, the organization of CAD/CAM data bases, the CAD/CAM Newsletter (!), CAD/CAM applied to the moulding of plastic materials, the automated construction of ships models for hydraulic testing using 5-axis NC and a robot-served adaptive manufacturing cell for producing turbine blades in test quantities. Copies are available without charge.

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

- "Computers in Industry", Spring 1986.

This third annual edition has once again been produced as a separate publication by the Maclean Hunter Publishing Company in addition to being bound into eight of their regular trade journals. The update deals primarily with CIM and its component technologies, ranging from CAD to Manufacturing Resource Planning (MRP), Just-In-Time (JIT) production, Programmable Logic Controllers (PLCs), Industrial Robots, Bar Coding, and a new entry, Artificial Intelligence.

Available in single copies \$10, five copies \$25 and additional copies for \$3 each.

Contact: R.A. Smith  
Maclean Hunter Ltd.  
777 Bay St.  
Toronto, Ontario  
M5W 1A7

- "Determining Grasp Positions for a Parallel Type Robot Gripper", NRC report no. 25659, G. Roth, Division of Electrical Engineering, January 1986.

Currently the programming of robots is a time consuming and tedious task. Ideally, the robot program should be generated automatically from a description of the task, modified when necessary by sensor input to compensate for uncertainties in the environment.

The report describes the application of computational geometry techniques to determine where a part of complex shape should be grasped by a robot gripper of the parallel jaw type. The algorithms work from a geometric model of the part, or if this is not available, from the part geometry as supplied by a three dimensional range finder. The algorithms described have advantages with respect to computational time, and that the best gripping points are identified.

Copies of the seventeen page descriptive report are available without charge.

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

- "PCB Populating Technologies"

This is a 200 page report describing 135 pieces of equipment from 50 vendors for the automated assembly of printed circuit boards. Tables and figures compare the cost, capability and performance of each machine. Additional volumes in the Flexible Assembly Systems and Technologies Series (FAST) are planned.

Contact: Ceeris  
P.O. Box 939  
Old Lyme, CO 05371, U.S.A.

## 6. CAD/CAM Quotes

- "The truth is, automation within a workcell may be much easier than automation to and from it."

D.G. Gayman in an article on automated guided vehicles (AGVs) as bridges to islands of manufacturing, Manufacturing Engineering, July 1986, pp. 33-35.

- "The scope of the robotics research being conducted by Japanese construction companies is far beyond anything American construction firms even contemplate".

J. Albus, National Bureau of Standards trip report as quoted in "Japan Leads U.S. in Construction Research and Robots, Robotics World, March 1986, p 8 ff.

- "Manufacturing is rapidly becoming more scientific - relying less on subjective methods and more on analysis, simulation and experiment. A recently published report of the President's Commission on Industrial Competitiveness points out that the single overriding reason for the loss of U.S. manufacturing leadership is that we have failed to apply our own technologies to manufacturing."

P.H. Francis in "Toward a Science of Manufacturing", Mechanical Engineering, May 1986.

- "Next, I have to stress the idea that management has got to get behind this. The people on the factory floor are not going to run out and put together a CIM strategy for you."

B. Moore in "Integration: A Vendor's Perspective" CAD/CAM and Robotics, October 1986.

7. Twenty Selected Abstracts Provide a World View on CAD/CAM

For a review of CAD/CAM developments around the world, please refer to the selection of twenty abstracts in the section attached. These will assist your organization to meet both the management and technical challenges of computer integrated manufacturing.

- 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.

\* Secretariat

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

\*\* Newsletter Editor

J. Scrimgeour  
Division of Electrical Engineering  
Bldg. M-50  
National Research Council of Canada  
Ottawa, Ontario K1A 0R6

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