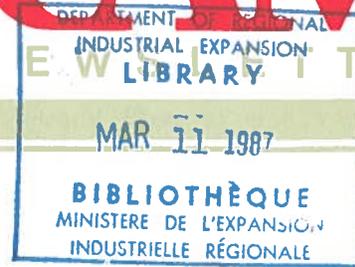




CAD/CAM



November-December 1986

Information Compiled by the Canadian CAD/CAM Council

for the Advancement of Computer Integrated Manufacturing *

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1. New Brunswick Holds Successful Microcomputer-Based CAD and CAM Workshop

A workshop on microcomputer based CAD and CAM, co-sponsored November 26-27 by the New Brunswick Manufacturing Technology Centre and the New Brunswick Department of Commerce and Technology provided a useful opportunity for attendees to update their knowledge and identify trends in this area. Approximately ninety persons attended.

Clearly the developments and changes in micro computer based systems will make CAD and CAM more affordable to many companies, particularly small and medium sized enterprises. From the various presentations made by users, developers and suppliers a few observations are worthy of note. In summary:

- Working level systems for CAD, including 40 megabyte hard disk, 19" colour monitor and hard copy printer are now available in the \$30,000 - 35,000 range.
- While the software for such systems is usually 2-D at the present time some are already 3-D and more will be in the near future.
- A number of the well known suppliers of turnkey CAD/CAM systems are now participating in this personal computer (PC) level market with modified versions of their software.
- Many of the PC level CAD systems therefore have the ability to interface upwards to larger turnkey or mainframe-based systems.

- Some have the ability to handle parts lists, bills of materials and to interface to well known "spread sheet" programs or data base managers for the further handling of this information.
- PC level systems for NC are already in use and can be expected to accelerate the adoption of CNC. For example, full five axis NC at the PC level will soon be available from one Canadian supplier.
- Other PC level CAM interfaces for flame cutting and sheet metal cutting exist and are in use.
- Once considered the domain of experts, users are now being urged by suppliers to generate their own post-processors. That is, to develop and write their own post processors using certain aids provided.
- CAD/CAM systems are being purchased and applied on a worldwide basis at the rate of 10,000 per month according to recent survey statistics.
- The technology is therefore in universal use. The successful companies and countries will be those that grasp and apply it.
- CAD is becoming a necessity in business, even just to bid on certain jobs.

4. Production Engineering Research Association (PERA)

Members of the Alberta Research Council are currently conducting a survey and study of industrial automation, in the course of which they have been visiting many organizations. The following brief description of the U.K. Production Engineering Research Association (PERA), has been extracted from notes provided by J. Reichbart, Technical Director, Special Projects, Advanced Technologies Department, Alberta Research Council.

PERA is a private non-profit organization located at Melton Mowbray in the United Kingdom. They have a subscription of some 1500 firms, primarily in the UK. Their research and education programs are mounted at the request of trade or industry associations. They also administer IRAP-like funds for the federal government. Their shops are comprehensive and they do perform pilot production runs for their customers. Software development includes production scheduling, robotics programming, factory simulation, computer aided design, and numerical control. Products developed in-house are licensed to interested firms for commercialization, distribution and support. Many projects are managed by the consortium approach.

The staff of PERA are currently planning the 'Factory 2000' project. Their idea is to implement a flexible, computer integrated, manufacturing cell for a particular class of products using modern manufacturing automation protocols. The demonstration system will be used, torn down, and used again for a variety of applications. The intention is to be opportunistic with the companies in their community. Research, pilot projects, tooling design, and new sensor applications will be driven by the business plans of the sponsoring companies.

3. Annual Meeting Held for CAC/ISO/TC 184

The annual meeting for CAC/ISO/TC 184 was held at NRC in Ottawa on December 2, 1986 with approximately twelve people present.

For readers unfamiliar with this "short-hand" coded nomenclature, it can be spelled out as the Canadian Advisory Committee (CAC) for the International Standards Organization (ISO) Technical Committee (TC) 184, which is the committee dealing with industrial automation systems and discrete parts manufacturing. The meeting was chaired by Dr. V.C. Thomson, Division of Mechanical Engineering, NRC who is the chairman for the CAC. The number attending reflects Canada's increasing interest and participation in this ISO activity.

While this was a meeting of the CAC which represents Canada's domestic interests through the Standards Council of Canada, a number of those present are also participating in the development of new standards directly at the international level through ISO international committees. That is, the representation on these international level ISO technical committees, sub-committees and working groups is made up of interested volunteers from various countries, including Canada.

Traditionally, or in areas where there is a slower pace of technology development, many countries might each develop a national standard to meet their requirement. Ultimately these would become reconciled into an accepted international standard. Today, or in the area of industrial automation at least, that intermediate or national standard step is being by-passed in many instances. Faced with the pace of development, and the costs of standards development which are too high for many nations to bear alone, collaboration and standards development is occurring directly and first at the international level. Individual countries may then elect to adopt or endorse the international standard as a national standard without having first developed a national standard.

ISO/TC 184 has sub-committees active in the following topics. Each sub-committee has a number of active working groups.

- ISO/TC 184/SC 1 - Numerical Control of Machines
- ISO/TC 184/SC 2 - Robots for Manufacturing Environment
- ISO/TC 184/TC 3 - Manufacturing Application Languages
- ISO/TC 184/TC 4 - External Representation of Product Model Data
- ISO/TC 184/TC 5 - System Integration and Communication

Some of the questions being addressed by the ISO Technical Committees include the following, but the full list is much longer.

- Whether to extend APT as a programming language for inspection machines in addition to its use for NC machine tools, or to have a totally new language for inspection?
- How to achieve real time data communication, recognizing that MAP, in its full implementation, may have timing problems for critical applications.

Persons interested to participate in the activities of the Canadian Advisory Committee for ISO/TC 184 should contact the chairman as follows:

Dr. V. Thomson
Chairman, CAC/ISO/TC 184
c/o Systems Laboratory, Building M-3
National Research Council
OTTAWA, Ontario
K1A 0R6

4. Book Reviews

- "Towards a New Era in U.S. Manufacturing - The Need for a National Vision", Manufacturing Studies Board. National Academy Press 1986. Soft cover 174 pp.

This report of the Manufacturing Studies Board (MSB) of the U.S. National Research Council is the result of an intensive effort over a two year period by the high level board and its staff members.

In its preface, the book cites the creation of a new era in manufacturing. This is due to the convergence of three trends; the rapid worldwide spread of manufacturing capability, the emergence of advanced manufacturing technologies and changes in traditional management/labor practices. Relatively few U.S. manufacturers are considered to have devised effective responses to these, yet the report authors believe that these trends will determine their long term competitiveness, and thereby the future prosperity of the U.S. economy. The report, therefore, presents a broad view on what the MSB believes will be necessary.

While many of the changes needed are technology driven, or have their sources in technology, the report recognizes that technology alone will not produce the results needed for competitive manufacturing. Changes are also needed in corporate structure, organization, decision making criteria and human resource management. Recognizing the variety of different situations for thousands of companies, the report does not attempt to offer solutions, but does seek to establish directions to be pursued.

An extensive appendix on the technology of future manufacturing provides tutorial summaries on many topics such as;

- Composite materials
- Numerically controlled machine tools
- Robots
- Computer aided design
- Data bases
- Group technology
- Flexible manufacturing systems
- Computer integrated manufacturing systems, and others

A further appendix reviews the recommendations of seventeen previous study committees, panels and commissions over the 1979-85 time frame all concerned with the signs of a weakening U.S. manufacturing industry. Many recommend changes to the tax structure and many recommend changes to encourage collaborative R&D, particularly at the generic technology level.

Possibly because the MSB contains many senior business executives in its twenty eight person membership, this report is one of the most perceptive and probably the most balanced presentations this reviewer has seen.

It is recommended reading for manufacturing industry managers, educators and government policy makers at all levels.

Reviewed by J. Scrimgeour, National Research Council.

5. CAD/CAM Information Available

- Canadian Manufacturing at the Crossroads"

This twenty eight page executive level overview is a position paper on advanced manufacturing technology by the Canadian Manufacturers' Association. It bears the same title, but differs in content from the forty minute videotape previously produced by the Canadian Manufacturers' Association and the federal Department of External Affairs. While not restricted to computer integrated manufacturing this particular technology or more correctly, set of technologies, is highly represented in the report.

The report, throughout, emphasizes:

- The importance of advanced manufacturing technologies in raising productivity and maintaining a competitive position.
- The need for top management commitment to technological change.
- The essential nature of communication and human resources.

For information on availability,

Contact: The Canadian Manufacturers' Association
One Yonge Street
Toronto, Ontario
M5E 1J9
Telephone: (416) 363-7261

Editors Note: The following six reports and books, all from different sources, each address this subject. They form a complimentary set and are highly recommended:

- 1 - "Management in Crisis: Implementing Computer Integrated Manufacturing in Canada". This is the 1986 report of the Canadian CAD/CAM Council as reviewed in the September CAD/CAM Newsletter and announced as available at that time.

- 2 - "Canadian Manufacturing at the Crossroads", as reviewed above.
- 3 - "Towards a New Era in U.S. Manufacturing", as reviewed elsewhere in this issue.
- 4 - "Restoring our Competitive Edge: Competing Through Manufacturing". R.H. Hayes, S.C. Wheelwright, J. Wiley & Sons, as reviewed in the CAD/CAM Newsletter, January 1986.
- 5 - "Robots in Manufacturing: Key to International Competitiveness". J. Baronson, Lomond Publication, Inc., as reviewed in the CAD/CAM Newsletter, March 1986.
- 6 - "Study of the Factors Affecting the Low Level of Automation in the Canadian Small and Medium Companies", L. Bianchin, as reviewed above.

- Useful Publications for CAD Users

The following two publications have been found to be useful by CAD users.

- "CADENCE"
(Using Auto CAD in the Professional Environment)

CADENCE Publications
12611 Research Suite
Austin, TX 78759, U.S.A.
Telephone: (512) 335-1731

Subscriptions \$34.95 (U.S.) in the U.S.A. and \$44.95 (U.S.) for international subscriptions

- "PLAN and PRINT"
(The magazine for design and reprographic management)

Published by the International Reprographic Association Inc.
9931 Franklin Ave.
P.O. Box 879
Franklin Park, IL 60131, U.S.A.

Canadian subscriptions are \$30 (U.S.) per year. PLAN and PRINT is the official magazine of the American Institute for Design and Drafting, 966 Hungerford Dr., Rockville, MD 20850, U.S.A., Telephone: (301) 294-8712

6. CAD/CAM Quotes

- "The author does not expect to see all these recommendations implemented immediately but he feels very strongly that unless Canadian manufacturing companies, large and small, both levels of governments,

educational institutions, and suppliers pull together their know-how, financial resources and trained manpower, to fight on a global scale, they will not survive beyond the end of the century."

L.M. Bianchin in a PhD dissertation entitled "Study of the Factors Affecting the Low Level of Automation in the Canadian Small and Medium Companies. A Fabricated Metal and Machinery Industry Perspective".

- "CAD is to geometry what the word processor is to words"

D. Hogg, Ontario Centre for Advanced Manufacturing.

- "If Canada is to compete in international markets, the adoption of CIM technology is imperative"

John Richardson in "Making CIM Happen", Computers in Industry (1986).

- "There must be top management commitment to technological change and to the need to make production facilities part of the arsenal to gain strategic advantage"

"Canadian Manufacturing at the Crossroads" a position paper on advanced manufacturing technology by the Canadian Manufacturers' Association.

- "Canada's program of economic renewal has as its goal the building of a national economy equipped to compete in an environment of intense global competition, changing markets, and new technologies."

Speech from the Throne to open the Second Session, Thirty-Third Parliament of Canada, October 1, 1986.

- "Not many Canadian companies are using computer-aided technologies. Many Canadian manufacturers are standing back waiting to see what will happen. When they figure it out, it'll be too late."

T.S. (Dudley) Allan, President, Control Data Canada, Ltd., Address to the Aerospace Industries Association of Canada, April 1986.

- "Canadian industry seems to lack the management skills and drive to develop new products, install new production technology, adopt techniques for cost competitiveness and quality control, motivate employees and market products worldwide."

David Crane, Toronto Star, January 15, 1986 in "Jobs are the Prize as Japan, Korea Challenge Canada".

- "A CIM system is created by the interconnection or integration of the processes of manufacturing with other processes or systems.--- The CIM environment will also make cost accounting systems based on direct labour obsolete."

"Towards a New Era in U.S. Manufacturing" National Academy Press
1986

- "Last spring, all of the CAD/CAM students were quickly snapped up - some even before graduation. Three hundred students are currently enrolled in the program."

"Readin', Ritin and Robots", a review of Camden County College activities (near Philadelphia) in the 1986/87 Robotics World Directory.

- "If you are not frightened by what is happening with technology, you don't understand what is going on."

Ian Sharp, President of Ian Sharp and Associates as quoted by G. Gow in "Canadian Manufacturing at the Crossroads".

7. Twenty Selected Abstracts Provide a World View on CAD

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.

By obtaining and using some of the references cited it is possible for industrial companies to save valuable management and engineering time in project planning and responding to the 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
Bldg. M-16
National Research Council of Canada
Ottawa, Ontario K1A 0R6

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