



CAD/CAM

NEWSLETTER

May 1986

Information Compiled by the Canadian CAD/CAM Council
for the Advancement of Computer Integrated Manufacturing *

Summary of this Issue

- 1 - Things to Look For
- 2 - Where to Look
- 3 - Robotics and Automation in Mining
- 4 - Book Reviews
- 5 - CAD/CAM Information Available
- 6 - Abstracts Provide a World View of CAD/CAM this Month
- 7 - CAD/CAM Quotes
- 8 - Newsletter Scheduling

1. Things to Look For

The amount of information on computer integrated manufacturing continues to increase at an exponential rate as the technologies represented take hold. In such an environment it becomes increasingly difficult to keep up, to see the forest for the trees, and to identify the developments of most importance. Above all, it is difficult in such a flood of information, to identify those items and sources most helpful to user organizations.

Here is a list of things to look for;

- Case histories on success - The management and technical experience of acknowledged leaders can be helpful in developing your own plans. Watch especially for organizational requirements and pitfalls to avoid.
- Advice on economic justification - Watch for helpful pointers on this subject in the case histories, and possibly information on the CAM-I project in this area.
- Competition - A recent survey and McGill University thesis (in preparation) identify fear of competition as the strongest motivational force in technological change. Watch therefore for information on the CIM activities of current or potential competitors.

- New applications - Watch for new application areas that could have potential application in your company or organization. For example, NC doesn't just mean machine tools and metal cutting. In the CIM world it means NC of every conceivable piece of production equipment.
- New equipment capabilities - The range of capability from CAD/CAM, robotics and CIM suppliers is continually expanding and the price/performance ratios improving. This is particularly evident, for example, in the area of PC based software and PC add-ons. The April CAD/CAM Newsletter contained three abstracts in this area.
- Strategic planning - It is being said, more and more, that Computer Integrated Manufacturing, due to its nature, must be approached from a strategic planning point of view and therefore demands top executive level involvement. Watch for more precise information on this, and in particular, what is strategic planning and how is it done.

2. Where to Look

The January and February Newsletters, in particular, provided a very complete list of reference sources, including centres, journals, societies and conferences. See also the abstracts included within each newsletter, which are much more than mere literature references when regarded as above. An additional list of sources, by type or category is given below. The question is "Are you using them all, or the best possible mix?" This is a serious question in today's technological and competitive environment.

Information Flow Paths, Channels & Media for Technology Diffusion

- | | |
|------------------------------------|---|
| - Daily press | - Books |
| - Trade journals | - Video tapes |
| - Equipment vendors and salesmen | - Computer aided learning |
| - Space advertisements | - Satellite broadcasts |
| - Direct mail advertising | - Network television |
| - Trade shows | - Computer messaging |
| - Sales literature | - Electronic mail (E-mail) |
| - Conference attendance | - New employees |
| - Published conference proceedings | - Foreign travel |
| - Seminars | - Technical college course - daytime |
| - Workshops | - Technical college course - evening or extension |
| - Cocktail party | - University course - daytime |
| - Committee meeting | - University course - evening or extension |
| - Newsletters | - Distance education (correspondence courses, etc.) |
| - Contact with a customer | - Monographs & special state-of-the-art reviews |
| - Contact with a supplier | - Retrospective literature search |
| - Contact with a competitor | - In plant training courses |
| - Internal memoranda | - On-the-job training |
| - Internal reports | |
| - Parent - subsidiary relationship | |
| - Licensing agreement | |
| - Consultant study | |
| - Technical society membership | |
| - Technology centre | |

From "Media for Technology Transfer and the Management of CIM Technology", J. Scrimgeour, February 1986. A background paper to the CAD/CAM Council report "Retreading A Nation".

3. Robotics and Automation in Mining

While Computer Integrated Manufacturing (CIM) and this newsletter are primarily directed towards the secondary manufacturing industry, newsletter readers may be interested to note that a parallel series of developments in somewhat different form are commencing in the mining industry.

A number of studies and workshops in various countries have investigated the possible use of robots in mines. While there may be some applications in special circumstances, these studies universally conclude that there will be little application, at least of industrial robots as they are now known. What is more realistic, and more likely, is that advances taking place in sensors, instrumentation, communication, control and systems development will lead to a new level of remote mining systems.

The development of mining methods and systems to reduce the effort required by the operator at the cutting face, and to improve operator safety, has a history as old as mining itself. Over many years systems have evolved from those which were purely manual to some recent automation systems, referred to as remote mining, in which no human involvement is required directly at the cutting face during normal operations. By means of remote control, sensing and communications techniques the operator will, in the future, be able to direct all essential operations in greater comfort and safety from a cabin or control room environment. This eventually, if economically and technically feasible, may be located a great distance from the face, even at the surface.

A review of these considerations was presented in a paper "Recent Developments in Remote Mining Systems" by authors from NRC and CANMET at the Annual General Meeting of the Canadian Institute of Mining and Metallurgy held in Montreal, May 11-15, 1986. In addition, following a workshop on mining automation organized in Sudbury, Ontario on March 12th, 1986, by CANMET and the Ontario Centre for Resource Machinery Technology, the participants from the mining industry, equipment manufacturing, universities and governments decided to form an Ad Hoc Committee on Automation in Mining.

The goals of the Committee are as follows:

- to promote the development and use of automation in Canadian mining
- to provide a forum for communication between the users
- to coordinate efforts on mining automation between other national and international organizations
- to recommend a Canadian position on International cooperation on mining automation

- to organize a workshop on Mining Automation in 1986
- to propose a permanent structure for the committee and the mechanisms for accomplishing some of the above
- to establish priorities for research and innovation reflecting the mining industry needs, and
- to establish a Centre for Mining Automation.

Interested persons are invited to comment on the proposed activities of the Committee by writing to its Chairman:

Mr. Jacques Nantel,
Manager,
Mining Technology Division,
NORANDA RESEARCH CENTRE,
240 Hymus Boulevard,
Pointe Claire, Québec
H9R 1G5

4. Book Reviews

- "Computer Integrated Manufacturing an Introduction with Case Studies", Paul G. Ránky, Prentice-Hall International U.K. Ltd (1986).

"This book is worth obtaining and reading. It presents a broad view of computer integrated manufacturing (CIM) along with a great variety of photos illustrating some of the hardware. This reviewer's positive reaction to the book came after reading it with some care. The initial reaction to this book was less positive, but these reservations are more than compensated for by the overall content.

The chapters of the book are as follows:

1. Introduction to Computer Integrated Manufacture
2. Overview of some general purpose software sub-systems and software tools used in CIM
3. The business data processing system of CIM
4. Computer Aided Design (CAD)
5. Computer Aided Manufacture (CAM)
6. Flexible Manufacturing Systems (FMS)
7. Introduction to scheduling models, computation methods and their application in FMS
8. FMS capacity planning and control
9. Batchsize analysis in FMS
10. Single and mixed product manufacturing and robotized assembly system balancing

To some extent our initial negative reaction was based on the organization of the book. The second chapter is a computer oriented chapter with manufacturing barely mentioned. We readily admit that "computer" is the first word in CIM, but somehow thought that manufacturing including FMS, CAD and CAM should have been discussed

before local area networks. We still tend to feel that way and if we were using the book as a textbook would use the chapters in a sequence other than that used by the author.

The author has a wide ranging knowledge and has personally become involved in a number of the subset CIM technologies. This definitely adds to his understanding and allows him to present a very worthwhile overview. One occasionally feels that he is working a bit hard to include his prior work, but perhaps that is natural.

The book is presented in a straightforward fashion - there are many references, but the author is generally presenting his views. This is actually refreshing and it is nice to clearly understand the author's position. The point is that this book reflects one man's perceptions, experience, and opinions and should be read with this in mind.

As with any book about a technology that is changing rapidly, there will always be some changes that surprise the author. As an example here, we mention MAP which apparently is becoming the defacto standard for computer networks (see *Frontiers*, November 1985, p 15). MAP is not even mentioned in Ránky's book. Obviously the author as recently as early 1985 (there are references to late 1984) did not foresee the impact and success that MAP would achieve. Certainly he would not have been alone and only in the last few months has MAP become so widely accepted. If an author waits until everything stops changing there would be little interest in one's book, but nevertheless the readers must be careful not to accept the book as definitive.

This book would be suitable and likely an excellent textbook if used by a knowledgeable instructor who could critique and expand upon the text. It would also make interesting and challenging reading for those who have some knowledge of and involvement in CIM or some of its subsets. We have a feeling that the "experts" would be less than satisfied with the chapter or chapters in the book with which they are experts, but would learn considerable from the other parts. We would not recommend this book for the individual who wants a text to read and study at home to learn about CIM. We feel that it needs some balance from the reader or the instructor to maximize its value.

This book is a major contribution to the literature and should have wide readership. We recommend it for *Frontiers* readers who certainly will be able to understand and appreciate it.

Paul G. Ránky, Associate Professor, Industrial Technology Institute, The University of Michigan, Ann Arbor, is formerly of Trent Polytechnic, Nottingham U.K. This 513 page book (ISBN 0-13-165655-4) can be obtained from Prentice-Hall Inc., Englewood Cliffs, New Jersey 07632."

The above review is provided from "Manufacturing Productivity *Frontiers*", January 1986.

5. CAD/CAM Information Available

- "Artificial Intelligence Applications in Manufacturing", James H. Cook, Manufacturing Technology Information Analysis Center (1985).

"This 47 page technical assessment provides an excellent introduction and review of the subject. Artificial intelligence (AI), after several decades as a research toy, is rapidly entering the real world including manufacturing. The hoopla and hype have made it difficult to determine what has really happened.

This document contains background including definitions of key concepts. The author also reviews the role of AI in manufacturing. He provides an AI application profile for Part Design, Process Planning and Scheduling, and Assembly and Process Control. A total of 51 applications are profiled in this way.

Overall this document is useful, readable and current. Our many readers who are evaluating AI for manufacturing should find this a useful introduction and reference source. This publication is available from the Manufacturing Technology Information Analysis Center, IIT Research Institute, 10 West 35th Street, Chicago, Illinois 60616."

The above review is provided from "Manufacturing Productivity Frontiers", January 1986.

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

For a monthly 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.

While the abstracts provided are informative in themselves, in most cases copies of the complete papers can be obtained from your nearest technical library, or from the Canada Institute for Scientific and Technical Information (CISTI), which is part of the National Research Council, as noted.

7. CAD/CAM Quotes

- "CAD/CAM technology will yield its greatest economic and productivity gains when -- the -- application areas are married or joined together to form an integrated system. Hence there is a strong development trend in this direction.
- CAD/CAM should not be thought of as being only synonymous with the numerical control of machine tools. It really refers to the entire manufacturing process.

- It would be a mistake -- to consider 'CAD/CAM' as a product development and supplied solely, or even primarily, by the electronics industry.
- CAD/CAM technology is of a systems, mechanical and manufacturing engineering nature, and needs to be developed 'in-house' by the user."

"Strategy for Survival", CAD/CAM Technology Advancement Council
1980 and "Closing the GAP", 1983.

8. Newsletter Scheduling

The CAD/CAM Newsletter is prepared on or prior to month end in camera ready form in English, ready for translation, printing and distribution as arranged by the secretariat of the CAD/CAM Council.

9. 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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