



# CAD/CAM

NEWSLETTER

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Information Compiled by the Canadian CAD/CAM Council

for the Advancement of Computer Integrated Manufacturing \*

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#### 1. 1987 CAD/CAM, Robotics and Automation Conference

The annual CAD/CAM and Robotics Conference was held in Toronto in June 1987, this year with the word "automation" appropriately added to its title.

The conference contained an excellent slate of papers, presented by highly qualified speakers, even improving on the high standard of past years, if indeed that were possible, but to an audience of only approximately 175 in number.

Within the first two hours of the two day conference attendees had been exposed to expert consulting advice that exceeded the registration fee by several times in value. It is puzzling, therefore, with approximately 35,000 manufacturing companies in Canada why conferences such as this are not as well attended as they might be. Attendance at the nearby trade show and exhibition totalled approximately 9600, which is similar to the previous year.

The conference attendance may indicate that the many CAD/CAM centres across Canada, and in the Toronto area in particular, are performing so

well with their many seminars on a year round basis that the conference demand is reduced accordingly; yet they too consistently report difficulty in reaching the senior corporate managers to whom their message is directed, particularly with regards to CIM.

Secondly, the attendance figures may indicate a Canadian tendency to seek purchased (and imported) solutions. This could be a false attitude, however, because much of CIM is not like that. Although there is a wide and increasing variety of CIM products available in the marketplace, the user must also be involved in planning and development at both the managerial and technical level.

As one of the newsletter quotes from a highly experienced user said recently, "Computer Integrated Manufacturing is hard to implement, and even harder to define. One thing is certain though: you can't buy it."

A third possibility, and one known to be true in many instances, is that many firms and their staff are so caught up in the business of implementing their CIM solutions that it is increasingly difficult to take "time-out" for conferences, irregardless of how relevant and valuable they may be. Whatever the reasons may be, the following review of key concepts and viewpoints expressed during the conference sessions is offered for those who were unable to attend, as well as for those who were.

Setting the theme for the first day's sessions focussing on management issues, Denis Hall of Coopers and Lybrand said in his opening paper, "more than ever before, we have to see the CAD/CAM opportunity as a need to manage change." Stressing the difficulties of justifying CIM using traditional but now outmoded accounting methods, he went on to say that "in the past it was almost child's play to do the calculations on savings, pay back and equipment justification, but "now we are talking about serious organization changes." In other words, planning now has to be a group exercise. Only the senior manager can orchestrate the things in different departments that need to happen simultaneously or synchronously. It will be necessary to invent some new accounting methods, to identify indirect costs as you go into CAD/CAM, but this is not to re-do the accounting system, "because you can't do it quick enough," Hall said.

Dr. N. Hill continued the first day's emphasis on management and CIM justification issues, pointing out the dilemma which exists because many senior managers are not technically oriented, and are therefore not comfortable with CIM technology. Nevertheless, it was stated, that any company in manufacturing today must be world competitive to stay in business.

R. Hagedorn of Arthur D. Little stressed that in CIM it is people who make the difference between succesful and unsuccessful installations. In a post CIM plant and contrary to the past, it is the plant not the people who make things, but it depends on the people to keep the plant in balance. A need for training was stressed. In the CIM plant it is necessary for employees to become problem solvers, willing to take action, and prepared to cross departmental boundaries when necessary.

With \$350 million yet to come for future phases, R. Abraham of Pratt & Whitney described their companies six year \$90 million venture into Computer Integrated Manufacturing. This has been undertaken primarily with the objective of gaining a competitive advantage through manufacturing excellence, in other words by making manufacturing a strategic weapon. As a result, they see a restructured manufacturing organization requiring:

- fewer people
- smaller organizational units
- fewer organizational layers
- fewer specialists
- fewer unskilled people
- a less formal organizational structure
- a greater emphasis on team responsibility
- a bold marketing thrust to support CIM.

Attendees were reminded by speakers that with CIM you are gambling the net worth of the company, but the alternative is going out of business, because it is a survival technology.

P. Brauninger from a medium sized USA company of 300 people, and winner of the SME 1985 LEAD award, stated that in their case the reduction of inventory paid for the investment. In the interests of self preservation his company is pleased to tell customers and potential customers about CIM technology, to help them stay in business, but competitors are urged "to study the problem a little longer." Let other people develop the technology, he urged, but make sure your people and senior management know how to use it. Integrate all systems and establish an economical order quantity (EOQ) of one was the advice given.

Summarizing the management oriented presentations, D. Hall pointed out that in small companies the existing management is the team for the justification of computer integrated manufacturing, but in large companies it may be necessary to pull a special team together especially for the purpose.

A feature of the conference for the first time this year was a special evening forum providing an overview of what is happening in CAD/CAM and CIM across Canada. Speakers representing all ten provinces participated, plus speakers from the Canadian Manufacturers' Association and the Canadian CAD/CAM Council who provided a national emphasis. A single minded effort was urged, otherwise Canada could end up as a third world country, one national speaker stated.

To highlight a few of the "Cross Canada" presentations:

- Companies in some provinces have expedited their entry into CAD/CAM by hiring new technical college graduates familiar with the technology.

- In some provinces, the introduction and application of CAD/CAM is being aided significantly through the use of remote terminals connected to a central computer system where many advanced state-of-the-art application packages are available.
- In Saskatchewan this is further facilitated by the availability of on-line assistance from a central operator when difficulty is encountered and help is needed. The central operator providing assistance has a screen and keyboard connected in parallel with the remote user, so that the same visual screens and commands are available, and is in verbal communication with the remote site.
- Companies in some provinces have adopted a "wait and see" attitude on CAD/CAM because they're uncertain how to start or where to turn for help.
- In other cases, companies have not necessarily installed and duplicated the large or medium scale systems used for demonstration purposes in the technology centres, but this familiarization with the technology has encouraged them to obtain personal computer level systems now available at lower cost.
- There is a need for more communication and greater coordination between the centres.
- As an interesting aside, a client project in British Columbia, successfully completed, involved the fairing of the lines for a kyack.
- In Alberta, advanced manufacturing technologies are seen as major elements in a strategy to diversify the economy of the province. The Advanced Technologies Department of the Alberta Research Council in Calgary, and the newly established Alberta Centre for Machine Intelligence and Robotics (ACMIR) at the University of Alberta in Edmonton are part of this, in addition to others.
- The difficulties of presenting a "Cross Canada" review, even at the provincial level were underscored by G. Pierce of the Saskatchewan Research Council who said in his summary, "I have a micro computer at home and am not totally aware of what my kids and the neighbour's kids are doing with it" -- let alone having a "completely accurate picture -- of CAD/CAM in [the whole province of] Saskatchewan." Nevertheless he was able to report that there are now fifty-two CAD/CAM workstations scattered throughout the province which has the most dispersed industry of any region in North America, and that "most of the major agricultural equipment manufactured by Saskatchewan manufacturing companies is now computer analyzed to some degree."

- The CAD/CAM and Robotics facilities under the Ontario Centre for Advanced Manufacturing (OCAM) are significantly reducing the "technology push" side of their activities formerly available through seminars etc., and are placing increased emphasis on projects oriented to analyze clients needs. These changes are also part of a thrust to obtain higher cost recovery, which was thirty six per cent for 1985/86 and thirty eight percent for 1986/87. On the other hand, and demonstrating the effectiveness of videotape, it is reported that 800,000 Canadians have seen their videotape describing the very successful robotics assembly work cell that assembles a transportation industry product at Echlin Canada. Company management have stated that the benefits of the project went far beyond the productivity and quality improvement provided in the work cell itself. "It stimulated the organization to re-examine all of its activities and helped to cultivate an attitude for change" as stated in the Ontario portion of the Cross-Canada national briefing.
- Speaking for the province of Quebec, G. Beaulieu described the work of the "Centre québécois pour l'informatisation de la production" (CQIP) which has a mandate to facilitate the diffusion of advanced technologies, including CIM, into the province's manufacturing industries. Twelve regional and sectoral laboratories have been established, linked by E-Mail at 2400 baud and remote graphics via a 9600 baud network. Technical data bases available via the network include CAN/OLE, DIALOG and QUESTEL.
- D. Bonham, speaking for the New Brunswick Manufacturing Technology Centres in New Brunswick also made reference also to their relationship with activities in Newfoundland (see CAD/CAM Newsletter April 1987) and with Prince Edward Island, although the latter is inactive at the present time. He also reported their finding that we have more Canadians who want CAD training, and who are qualified to do so, than can be handled by current facilities.
- On a national basis, E. Cinitis reviewed the work of the CAD/CAM Council since its formation in 1978, with emphasis on its publications such as the 1980 report (which had considerable influence in Canada), the regularly distributed newsletter, the 1986 report "Management in Crisis" and the council's projects recommended to the Department of Regional Industrial Expansion in 1987 for implementation. (see CAD/CAM Newsletter February 1987).
- As newsletter readers are aware, the department has advised the council that support for the council will be terminated and its future is therefore in doubt. However the council chairman has received verbal authorization from departmental officials to continue the council's operations as long as required to affect an orderly transition to a new facility that may be established.

## Summary

- CAD/CAM and CIM are progressing and well in Canada, but there is much to be done.
- The widely distributed network of facilities now established, and which places an emphasis on decentralized decision making, provides for a maximum level of activity at minimum risk.
- There is a continued need to inform many companies, and senior management in particular, of what CIM technology and its impact means to their organization.
- With a trade deficit in manufactured end-product exceeding \$400 million per week, there is obviously a lot remaining to be done and we can ill afford to reduce or terminate activities sorely needed.
- A number of the technology centres are shifting towards a higher cost recovery rate and a greater emphasis on assisting clients to analyze their basic design and production problems, rather than emphasizing the new technologies per se. Most centres are tracking and responding closely to industry needs.
- A conference speaker, whose firm has operational activities in the far east, advised that China has made a basic decision to use CAD/CAM and numerical control as the nucleus of an industrial strategy aimed at becoming a major manufacturing power in the 1990's. In other words, to establish an accelerated commitment to those technologies which would enable their industry to accomplish in five years what the industrialized countries of the western world have accomplished in the past fifteen years.
- Dates announced for next years CAD/CAM and Robotics Conference and Exhibition are June 14-16, 1988.

## 2. IEEE Video-conference by Satellite

The IEEE 18th video-conference, and the first on the subject of "Computer Integrated Manufacturing: Basic Architecture Models" was broadcast from 10:00 a.m.-4:00 p.m. June 17 by satellite to approximately 175 receiving sites, this time including one site in Stockholm, Sweden. It has also been shown to additional audiences. For example NRC regularly arranges showings of these satellite broadcasts for local industry and research personnel using taped versions obtained with permission from the IEEE.

The five hour satellite presentation features talks and discussion periods on CIM architecture with Dr. Dell, K. Allen of Brigham Young University, case history presentations by large, medium and small sized

companies and a special session on patents relating to CIM, particularly in view of the four "Williamson" patents. These patents, issued in the U.S.A. between 1966 and 1970, plus a subsequent re-examination certificate, have very wide claims..

Satellite and video presentations such as this are an effective communication media for information on CIM. As noted earlier in this issue, the Ontario Centre for Advanced Manufacturing (OCAM), reports that their videotape on robotics assembly at Echlin has been viewed by more than 800,000 Canadians. The TV Ontario four part series on CAD, CAM, FMS and CIM aired in April and May 1987 has been seen by a very large audience and is available by lease arrangement.

In many ways the IEEE and TVO programs are largely complimentary to each other. Because of their highly edited format and many site visits, the four TVO half hour programs pack a great deal of concentrated and convincing material into the time available. On the other hand, the longer but unedited IEEE live broadcast is able to delve more deeply into basic questions concerning CIM architecture, data base requirements, economic justification, CIM project management, plus human and socio-economic considerations.

The view is expressed in the IEEE program that CIM must be part of any corporate strategic plan. Concern is expressed for the 500,000 manufacturing firms in the U.S.A., 70% of which have less than 20 employees, and who may not have the resources to adequately address this new technology. Mention is made by a U.S. based speaker of the Canadian centres which are considered to be very succesful in introducing advanced technologies into small and medium sized companies. A ten point check list to assist companies plan their CIM projects is included in the documentation booklet available to accompany the video material.

For information on availability of the IEEE satellite broadcast on CIM in videotape form contact:

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

3. News from the Canadian CAD/CAM and Robotics Centres

OCAM's Robotics Centre, located in Peterborough, Ontario, has been using specialized software on its CAD/CAM System to dynamically display and simulate proposed robotic workcell designs. This 3D computer graphic simulation is the first phase of the design process. It allows for a variety of robot types to be tried and their performance compared under the same set of circumstances.

This software was developed specifically to assist design engineers to accurately layout robotic workcells and to better determine production cycle times.

A newly discovered function of the robotic simulation software has been in the area of visual aids. Almost any mechanical device can be simulated and animated to show its components in motion. The screen graphics can then be video taped or photographed to help in explaining a new idea or to show a modification to an existing product. This approach was developed by accident when a small manufacturing company wanted to explain to a non-technical audience how its new product would be assembled. The product, a heavy mechanical assembly, was modelled on the computer and a sequence written to show all of its components being assembled in the correct order. After the assembly was displayed graphically, another programme was written to show an exploded parts assembly with all of the components slowly being disassembled.

Experience has proven that more time is required to convert blue print part information to CAD graphics than it is required to programme the simulation. If the parts to be animated exist on another 3 dimensional CAD station then this data can be transferred directly to the simulator, greatly reducing the overall project time.

Computer graphic simulation is not just another engineering tool but could become a viable means of communicating ideas visually.

CONTACT: OCAM - ROBOTICS  
RON LIPSCOMBE  
(705) 876-1611

#### 4. CAD/CAM Conferences and Exhibitions

- "1988 IEEE International Conference on Robotics and Automation"  
April 25-29, 1988 Wyndham Franklin Plaza Hotel, Philadelphia, Pa.

The announcement and call for papers has been issued for the above conference. Prospective speakers should submit four copies of long papers (approximately 15 to 20 double spaced pages, including figures) or short papers (approximately 5 to 7 double spaced pages, including figures) by September 15, 1987 to the contact listed below.

Conference topics include, but are not restricted to the following:

- Applications in prosthetics, rehabilitation, handicap assistance.
- Automation and manufacturing systems.
- Control, dynamics, and manipulator design.
- Devices, architecture, and expert systems.
- Electronics manufacture.
- Intelligent systems in automation.
- Mobility and navigation.

- Robot vision and inspection systems.
- Robotics in construction, underwater, and hostile environments.
- Sensors.
- Space applications.
- Systems architectures and programming.
- Systems design software and simulation.

Authors will be notified of acceptance Dec. 1, 1987. Final papers due in camera ready form Jan. 15, 1988.

Contact: Robert B. Kelley  
ECSE Department  
Rensselaer Polytechnic Institute  
Troy, NY 12180-3590

#### 5. CAD/CAM Quotes

"Retrofitting should be an important part of any strategic plan in a CIM environment."

D. Roberts, Solar Computers, Cambridge, Ontario  
Sixth Canadian CAD/CAM, Robotics and Automation Conference, June 1987.

"The real value of a machine vision system is not just to throw away the defective parts and objects, but to identify what they are and enable one to fix the machine at the source which is making them."

R. Griffin, Qualiplus/Continental Can Canada Inc. Toronto  
Sixth Canadian CAD/CAM, Robotics and Automation Conference, June 1987.

"78% (of companies surveyed) are so tied to the traditional capital budgeting process - they can't realistically evaluate advanced manufacturing technology."

Prof. N. Hill, School of Business Administration, University of Western Ontario,  
Sixth Canadian CAD/CAM, Robotics and Automation Conference, June 1987.

#### 6. Twenty Selected Abstracts Provide a World View on CAD

Last, but not least, for a review of CAD/CAM developments around the world, please refer to the selection of twenty abstracts in the section attached.

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.

7. Newsletter Availability

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