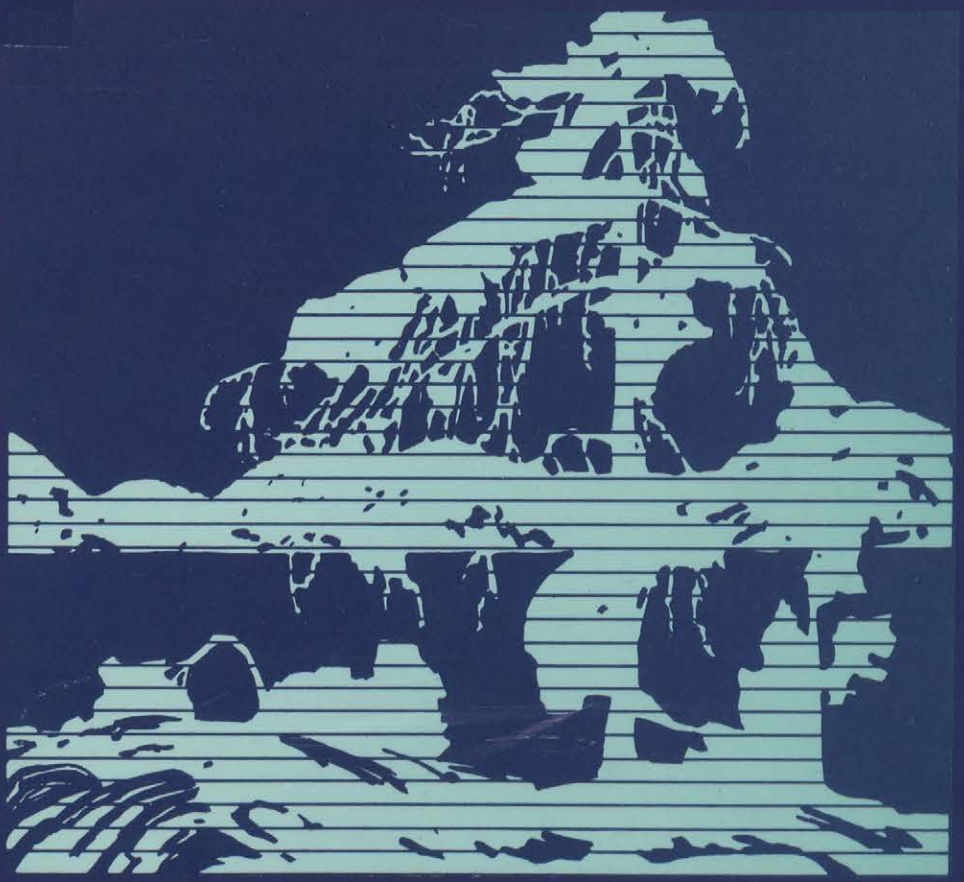

CAD/CAM Products and Services in Canada

A Directory of Companies and Organizations Providing CAD/CAM Products and Services in Canada

INTRODUCTION

This second edition of the CAD/CAM Directory was produced by the Technology Branch of the Department of Industry, Trade and Commerce to provide current information on Canadian supplier capabilities for the automated design and manufacturing technologies field, i.e., specifically companies and organizations providing Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) products and services in Canada.

Listings appear under four headings:
Suppliers of Equipment and Consulting/Design Services, Associations and Societies, Research Organizations, Educational Institutions. The table of contents lists the entries in the directory, and a suppliers' subject index follows it.

The criteria for inclusion are:

a. The capability to supply complete systems, major equipment components or services directly related to automated design or manufacturing applications.
b. An existing office or business address in Canada.

Because of these criteria, many major suppliers of related equipment, including suppliers of machine tools, material handling equipment and controls and instrumentation, have not been included. Listing for these companies can be found in their corresponding industrial catalogues and directories.

The directory was compiled by Corpus Information Services Limited with the technical assistance of the Technology Branch of the Department of Industry, Trade and Commerce. It contains listings which were prepared from questionnaires, supplemented by interviews in many cases. A number of organizations have been described in some detail to illustrate the variety of products and expertise available in Canada.

A growing number of Canadian companies are extremely active in the field of Computer Aided Design and Computer Aided Manufacturing (CAD/CAM) as *users*. It should be noted that many of the *user* companies, that are not listed, share their knowledge and experience in the CAD/CAM field through active support of the associations and societies listed in this directory.

Similarly, both Canadian suppliers and users are playing an important role in the development of a variety of educational training programs, many of which are being introduced by Canadian universities and colleges. The educational training requirements to meet the evolving CAD/CAM needs are being met in a variety of ways, and readers are urged to contact the educational institutions, associations and societies directly for their latest program offerings.

While these listings are believed to be comprehensive, some organizations may have been missed. Also, in the rapidly developing CAD/CAM robotics field new organizations are being formed which could be included in future editions.

Please direct applications for future inclusion, changes to existing listings or general inquiries to:

CAD/CAM Directory
c/o Technology Branch (61)
Department of Industry, Trade
and Commerce
235 Queen Street
Ottawa, Ontario Canada
K1A 0H5

Requests for additional copies of this directory should be made to:

The Business Centre
Department of Industry, Trade
and Commerce
235 Queen Street, Level 01
Ottawa, Ontario Canada
K1A 0H5

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SUPPLIERS OF EQUIPMENT AND CONSULTING/DESIGN SERVICES

A.C. Wickman Limited

1425 The Queensway
Toronto, Ontario, Canada
M8Z 1T4

Telephone: (416) 259-2311

Chief Executive Officer: W.B. Bone, Vice-President and General Manager

Size: 35 employees; annual sales over $2,000,000

Activities: This wholly-owned subsidiary of Kennametal Ltd. supplies computer-controlled inspection gauges and instruments; co-ordinate measuring machines; positioning systems; surface finish and texture inspection instruments; automatic gauging and assembly machines; in-process gauges and controls; layout and inspection machines; multiple-form grinders.

A.C. Wickman represents the following manufacturers: Automation and Measurement Division of The Bendix Corporation, Bridgeport milling machines, Burgmaster machining centres, De Vlieg machining centres, Elox electrical discharge machines, Moore jog grinders, Okuma lathes, Webster & Bennett vertical boring mills.

It also provides training programs for this equipment.

ACCO-Canadian Material Handling

Division of Dominion Chain Inc.
1100 Blair Road
Burlington, Ontario, Canada
L7M 1K9

Telephone: (416) 335-3535

Telex: 0618721

Chief Executive Officer: R.P. Lane, General Manager

Senior Marketing Executive: G.R. Moore, Manager of Sales and Engineering

Branch: 6434, route Trans Canada
Saint-Laurent (Québec) Canada

Size: 120 employees, annual sales between $2,000,000 and $20,000,000

Activities: Supplies computerized parcel sorting, mail handling equipment, package conveyors, conveyor systems; provides consulting services; designs and installs systems.

Ahearn & Soper Ltd.

29 Enterprise Road
Rexdale, Ontario, Canada
M9W 1C4

Telephone: (416) 245-4848

Chief Executive Officer: J.H. Paul, President

Senior Marketing Executive: Peter Fedak, Vice-President, Marketing

Size: over 100 employees; annual sales over $12,000,000

Activities: Sells add-on computer peripherals and terminals. Its electrostatic printers and plotters, which are used extensively in CAD systems, are produced by Versatec Inc., a Xerox company represented in Canada by Ahearn & Soper. The Matrix Electrostatic Writing Technique (MEWT), used by Versatec, is practical for design applications, and the plotters' ability to convert massive computer data into revealing graphics make the product suited to computer-aided design of integrated circuits and PCBs, as well as architectural and construction simulations.

Through Viditon Corporation Ltd., an affiliated Toronto company, Ahearn & Soper manufactures and markets a printer terminal for computer communications. The terminal can be applied to the CAD field as an input console to instruct a digitizer, for software program development, or for preparation and editing of NC tapes. The company also markets magnetic tape storage and disc storage equipment.

Alfred Herbert (Canada) Limited

19 Shorncliffe Road
Toronto, Ontario, Canada
M9B 3S4

Telephone: (416) 223-3206

Chief Executive Officer: Ian Simpson, Vice-President, Herbert (Canada)

Activities: Alfred Herbert sells and services computerized machine tools such as computer NC turret lathes and four lines of NC machining centres, Batchmatic, Ooya, Matsuura and Dainichi.

Allan Crawford Associates Ltd.

6427 Northam Drive
Mississauga, Ontario, Canada
L4V 1J5

Telephone: (416) 678-1500

Chief Executive Officer: R. Dunne, President

Activities: Graphic displays, microprocessor system testers, PROM programers for testing microprocessor systems, and automatic testing equipment such as digital and hybrid testers are available from Allan Crawford for CAD/CAM applications. The company also sells I/O computer systems such as data acquisition systems, parallel/serial data links, analogue/digital I/O subsystems, analogue computers and hybrid computers.

Chief applications are in mapping, PCB design, Fluke-Trendar logic board testers, and Plexus network analyzers.

Allen Bradley Canada Limited

135 Dundas Street
Cambridge, Ontario, Canada
N1R 5X1

Telephone: (519) 623-1810

Telex: 069-59317

Chief Executive Officer: W.E. Hetherington, President

Senior Marketing Executive: W.C. Torrance, Vice-President Marketing

Size: 750 employees

Activities: Designs and furnishes complete production line systems tailored to customer needs; designs products and/or systems, manufactures products; sells products and/or systems; programable controllers, lathe control systems, programable control for paper mill processes and machines, transfer lines and the automotive industry.

Ammco Industrial Equipment Ltd.

37 Voyager Court North
Rexdale, Ontario, Canada
M9W 3G4

Telephone: (416) 675-7761

Telex: 06-989226

Chief Executive Officer: Percy E. Avery, President

Branch Office: 3400, boulevard Cremazie est
Montréal (Québec) Canada

Size: annual sales between $2,000,000 and $20,000,000

Activities: Sells computer-controlled Matrix-Churchill lathes and San Rocco horizontal boring mills, plus a wide variety of other machine tools.

Apple Canada Inc.

875 Don Mills Road
Don Mills, Ontario, Canada
M3C 1B9

Telephone: (416) 444-2531

Chief Executive Officer: Andre Sousan, President

Activities: Starting in May, 1981, Apple Canada began distributing to its dealers across Canada a variety of products including microcomputers, disc drives, monitors, printers, software and three major systems: Apple II, Apple II Plus and Apple III. The three systems cater to many sectors, especially small business and the educational field.

Arthur D. Little of Canada Ltd.

120 Eglinton Avenue East
Toronto, Ontario, Canada
M4P 1E2

Telephone: (416) 487-4114

Chief Executive Officer: Paul C. White, President

Size: four employees

Activities: This consulting firm, the Canadian branch of the United States parent company in Cambridge, Massachusetts, offers advice on the evaluation, selection and use of CAD/CAM robotics equipment and techniques. In Canada, its focus to date has been in the CAM area, producing market research studies of the international opportunities for Canadian designers and manufacturers of CAM products.

In addition to local resources, the Canadian company may draw on the resources of the parent company and its 2,600 employees around the world. Its IMPACT services, featuring consulting, research letters and reports are also available through the Canadian company. Many research reports pertain to aspects of the CAD/CAM robotics field, such as, "The Growth in U.S. Industrial Robotics".

Atomic Energy of Canada Ltd. (AECL) Research Company

275 Slater Street
Ottawa, Ontario, Canada
K1A 1E5

Telephone: (613) 236-6444

Telex: 053-4867

Chief Executive Officer: R.G. Hart, Executive Vice-President

Branch Office: Chalk River Nuclear Laboratories
Chalk River, Ontario, Canada
K0J 1J0

Whiteshell Nuclear Research Establishment
Pinawa, Manitoba, Canada
R0E 1L0

Size: 2,500 employees, annual sales over $20,000,000

Activities: AECL, a crown corporation, maintains two CAD facilities at its Chalk River Nuclear Laboratories and one at Whiteshell. The electronics group at Chalk River uses an Advanced Design System (ADS) tailored to the specific requirements of electronic design. The Design and Services Branch at Chalk River has a facility used as a general design aid, while the CAD system at Whiteshell is used for general support services.

AECL does not provide CAD services to industry, but does provide access to its personnel and expertise for companies interested in acquiring or improving CAD within their own organizations.

B. Elliott (Canada) Ltd.

478 Evans Avenue
Toronto, Ontario, Canada
M8W 2T9

Telephone: (416) 252-5252

Telex: 06-967558

Chief Executive Officer: R. Erwin Fischer, President

Senior Marketing Executive: Michael Carr, Executive Vice-President

Branch Offices: Edmonton, Alberta; Truro, Nova Scotia

Branch Plants: Montreal, Quebec; Vancouver, British Columbia

Size: 130 employees, annual sales between $2,000,000 and $20,000,000

Activities: Designs, furnishes and installs CAM systems. As Canadian subsidiary of B. Elliott International Ltd., supplies machine tools of English parent company's manufacture, NC lathes and programable controllers. Represents the following companies in the field of computer numerical control: Matsuura, Nakamura Tome, and Yasuda (Japan); Droop & Rein, Gildemeister, and Behrens (West Germany); Comec (Italy).

Bachan Aerospace of Canada, Ltd.

300 East Pike Creek Road
Emeryville, Ontario, Canada

Telephone: (519) 727-6666

Telex: 064-77817

Chief Executive Officer: Michael J. Brzoska, President

Senior Marketing Executive: William A. Morelli, Vice-President, Marketing

Senior Engineering Executive: E. Ropac, Vice-President, Manufacturing

Size: 80 employees, annual sales between $2,000,000 and $20,000,000

Activities: Bachan Aerospace has designed and built a multi-station gear grinding machine which is computer-operated and will be available for the market after an initial testing period. It is also designing and building a multi-station computer-operated drilling machine with applications in the petroleum industry.

A Canadian subsidiary of Bachan Aerospace Corporation of Madison Heights, Michigan, it has been designated as the company's CAD/CAM centre for research and development. The new products designed and developed in Canada will be marketed in the U.S. by the parent company.

Barer Engineering & Machinery Company Ltd.

1365, rue Basin
Montréal (Québec) Canada
H3C 1W3

Telephone: (514) 937-3911

Telex: 05-267585

Chief Executive Officer: A. Barer, President

Senior Marketing Executive: D. Barer, Vice-President

Branch: 41 Horner Avenue
Toronto, Ontario, Canada
M8Z 4X3

Size: 25 employees, annual sales between $2,000,000 and $20,000,000

Activities: Barer provides computer NC machining equipment such as NC machine tools and NC metal-working products for the manufacturing industry. It designs, furnishes and installs complete production-line systems and also provides consulting services.

Barker Industrial Equipment

261 Bowes Road
Concord, Ontario, Canada
L4K 1B1

Telephone: (416) 661-2280

Telex: 06-964548

Chief Executive Officer: G. Horsey, President

Senior Marketing Executive: G. McCullock, Assistant General Manager

Size: 10 employees, annual sales between $2,000,000 and $20,000,000

Activities: Provides computer numerical-controlled tooling equipment; represents Scharmann, Lodge & Shipley and Daewoo in Canada.

Baxter Energy Systems Corp.

Baxter House, 4th Floor
51 Yonge Street
Toronto, Ontario, Canada
M5E 1J1

Telephone: (416) 364-2331

Telex: 06-218540

Chief Executive Officer: John Thompson, President

Standard Modern Technologies Division
69 Montcalm Avenue
Toronto, Ontario, Canada
M6E 4N9

Telephone: (416) 787-2496

Telex: 065-24450

Chief Executive Officer: Ken H. Jones, President

Senior Engineering Executive: W. Hibbins, General Manager

Size: 330 employees, annual sales between $2,000,000 and $20,000,000

Activities: This division manufactures machine tools with computer numerical controls; designs, furnishes and installs complete production-line systems tailored to customer needs; provides precision machined components and assemblies, nuclear power station components and assemblies, engine lathes and machine tools. It is also developing expertise in computer-aided design.

A.R. Williams Division
69 Montcalm Avenue
Toronto, Ontario, Canada
M6E 4P1

Telephone: (416) 787-2496

Telex: 065-24450

Chief Executive Officer: Ken H. Jones, President

Senior Engineering Executive: A.E. Esser, General Manager

Size: 27 employees, annual sales between $2,000,000 and $20,000,000

Activities: This division markets a large number of machine tools produced by other manufacturers. It provides Standard Modern and Jones & Lamson computer numerical control machines and direct computer control machines, TN/C inspection centres, computer-controlled parts inspection systems. The division designs, furnishes and installs complete production-line systems tailored to customer needs, designs products and/or systems, provides consulting services and financing, leasing, and designs for equipment and facilities for a complete range of numerical control, computer numerical control, and direct computer control equipment for manufacturing processes.

Bedford Enterprises

550 Sennel Avenue East
Hamilton, Ontario, Canada
L8V 4S7

Telephone: (416) 383-9452

Chief Executive Officer: Larry Bedford, President

Size: 2 employees, annual sales less than $50,000

Activities: This new Hamilton-based company supplies software packages, with graphics capability, for punch presses in the manufacturing sector. Bedford designs and installs a complete software system and also provides consulting services.

Bell-Northern Research Ltd.

P.O.Box 3511, Station C
Ottawa, Ontario, Canada
K1Y 4H7

Telephone: (613) 596-2210

Telex: 053-3175

TWX: 610-562-1914

Chief Executive Officer: J. Roth, Executive Vice-President

Senior Marketing Executive: R. Fortune, Director, Marketing

Branches: BNR Inc., Mountain View, California, U.S.A.
BNR Ltd., Toronto, Montreal, Edmonton

Size: 2,500 employees, annual sales more than $20,000,000

Activities: Bell-Northern Research (BNR) is the largest private laboratory in Canada, providing research and development for Bell Canada and Northern Telecom Limited on a project basis. Northern Telecom's advanced communications products required CAD to provide fast accurate circuit designs for new custom built large-scale integrated (LSI) devices. GRAPPLE (Graphics Application Programing Language) is a language used by engineers to interact with a computer data-base in order to create, alter and manipulate graphic information.

BNR has also developed a system that uses the computer to assist in the layout and documentation of printed circuit boards (PCBs). The project, called the Circuit Pack System (CPS), includes a System for Placement and Routing using Interactive Graphics (SPRIG) and a schematic system called (LOKI). Once the schematic diagram of the PCB is entered into the system, SPRIG assigns logic functions to appropriate ICs, places all circuits on the board in the optimal positions, and automatically interconnects all components. Automatic routing typically completes 95 to 98 per cent of a PCB layout, the rest is done manually with a powerful graphics editing system. LOKI permits the layout and routing of aesthetically pleasing schematic diagrams for product documentation purposes.

BNR has also developed computer aids in the form of utility packages and application software. The multi-disciplinary BNR resource includes computer hardware and software experts, system and circuit designers, and outside plant and mechanical engineers, who are available as a problem-solving centre to clients.

Beta Machinery Analysis Ltd.

6425 Bowness Road Northwest
Calgary, Alberta, Canada
T3B 0E6

Telephone: (403) 288-4623

Chief Executive Officer: Dave Schuh, President

Senior Marketing Executive: Adrian Levine, Marketing Manager

Size: 10 employees, annual sales between $250,000 and $2,000,000

Activities: Designs products and/or systems; provides consulting services: conducts research and development; dynamic structural analysis of piping systems for vibration and pulsation control; performance calculations for multi-stage reciprocating compressors.

Binks Manufacturing Co. of Canada Ltd.

17 Vansco Road
Toronto, Ontario, Canada
M8Z 5J5

Telephone: (416) 252-5181

Chief Executive Officer: C. Baranowski, Vice-President and General Manager

Senior Marketing Executive: J. Verge, Marketing Manager

Branches: Vancouver, Edmonton, Montreal, and London, Ontario

Size: over 80 employees, annual sales greater than or equal to $2,000,000 but less than $20,000,000

Activities: The Canadian arm of Binks Manufacturing Co. of Franklin Park, Illinois, this company sells computer-controlled equipment produced by its parent company for the finishing industry (paints).

The CAD/CAM Centre Ltd.

700 Industrial Road
Ottawa, Ontario, Canada
K1G 1Y9

Telephone: (613) 526-0620

Contact: E.J. Carroll, Co-ordinator

Activities: Concerned with the application of computers to the design and manufacture processes. Its aim is to foster Canadian industrial growth in this field and in world markets.

The Centre plans to co-ordinate the marketing activities of its member companies, establish regional centres, disseminate CAD/CAM information, funnel market inquiries to the appropriate company, identify new product opportunities, establish new enterprises as appropriate, lobby on behalf of the industry, provide a forum for exchange-development of CAD/CAM expertise, encourage the formulation and adoption of industry standards, engage in R&D programs in co-operation with government, educational institutions and industry, identify training requirements and work with schools to develop suitable programs, and build industry and government awareness of the advantages of the CAD/CAM field.

Member companies: CAD/CAM Circuits Ltd.
Cad-teck Ltd.
Innovative Technology Inc.
Phoenix Automation, Inc.
Poynton Veckor Corp.

CAD/CAM Circuits Ltd.

700 Industrial Road,
Ottawa, Ontario, Canada
K1G 1Y9

Telephone: (613) 526-0620

Chief Executive Officer: Thomas R. Doylend, President

Senior Marketing Executive: Chris Coates, Marketing Manager

Size: 18 employees

Activities: This company manufactures printed circuit boards for CAD/CAM Graphics Systems Ltd. and the electronic industry in general.

CAD/CAM Graphic Systems Ltd.

700 Industrial Road
Ottawa, Ontario, Canada
K1G 1Y9

Telephone: (613) 526-0620

Chief Executive Officer: E.J. Carroll, President

Senior Engineering Executive: Pak Sit, Director of Operations

Sales and Design Office: 3261 Kennedy Road, Unit 17, Scarborough, Ontario, Canada

Telephone: (416) 298-6664

Senior Marketing Executive: Frank Duregon, Director of Marketing

Size: over 30 employees, annual sales greater than or equal to $250,000 but less than $2,000,000

Activities: Markets computer-generated artwork for printed circuit boards, hybrids and integrated circuits (ICs) and computer-aided graphic systems for mechanical drafting, architectural and schematic diagrams. It also provides consulting services in CAD.

CAE Morse

Division of CAE Electronics Ltd.
4500 Dixie Road
Mississauga, Ontario, Canada
L4W 1Z6

Telephone: (416) 625-5161

Chief Executive Officer: Arnold R. Tunis, President

Senior Marketing Executives: J.E. Peffers, Vice-President and General Manager
Murray S. Roberts, National Marketing Manager

Size: over 200 employees

Branch Sales Office: 195, boulevard Brunswick
Pointe-Claire (Québec) Canada
H9R 4V6

Activities: Sells CNC standard equipment produced by several U.S. firms. Its principal involvement in the CAD/CAM field is as the Canadian representative for Unimation Inc. of Danbury, Connecticut, which manufactures industrial robots. The company provides system design services and maintenance services. Tape preparation systems are also available.

CADEIS International Ltd.

39 Highway #7, Suite 202
Nepean, Ontario, Canada
K2H 8R2

Telephone: (613) 820-5210

Telex: 0534141

Chief Executive Officer: Dr. Leslie Klein, President

Senior Marketing Executive: John Koiste, Manager

Size: 21 employees, annual sales between $250,000 and $2,000,000

Activities: Formed in May, 1980, CADEIS International provides printed circuit board (PCB) design services for the electronic industry. The parent company is CADE St. Gallen in Switzerland. CAD products and services include PCB design service, CAD system consulting, and CAD system sales.

PCB design service is a design automation system in which electronic schematic diagrams are graphically inputted with the use of a graphics terminal. The computer uses schematic information to perform automatic routing of PCBs.

CADEIS sells complete turnkey (fully put together by the company) systems that include full support for one year. The company is working in the areas of mechanical engineering, hybrid circuit design, and simulation and testing, and plans to release products soon.

Cadsys Limited

353 Water Street
Vancouver, British Columbia, Canada
V6B 1B8

Telephone: (604) 682-0646

Chief Executive Officer: A.M. Lount, President

Activities: CADSYS designs and supplies special-purpose computer systems for the CAD/CAM marketplace and many applications are used in the manufacturing and construction industries.

The company has computerized preparation of punched paper tapes for numerically controlled machine tools and expects to extend its CAD/CAM concepts into the

design and production of concrete beams and slabs, and to electrical distribution systems and piping layouts.

CADSYS offers a complete hardware and software package, including an Interdata 732 computer with extended time-sharing virtual memory, which can provide an organization with its own in-house time-sharing CAD system.

In the architectural field, the company plans to develop an original approach to interactive graphics: instead of basing the system on an interactive tablet, it proposes to capture data, put it into a database, and develop a file from the database that can be worked on interactively.

CAD-TECH Ltd.

R.R. #3,
Kinburn, Ontario, Canada
K0A 2H0

Telephone: (613) 839-5700

Chief Executive Officer: Clifford C. Inwood, P. Eng.

Size: 5 employees; annual sales of less than $250,000

Activities: This company, incorporated in 1980, provides design consulting services for CAD/CAM with emphasis on the manufacturing end.

California Computer Products of Canada Ltd. (CALCOMP)

55 Westmore Drive
Rexdale, Ontario, Canada
M9V 3Y6

Telephone: (416) 745-9610

Chief Executive Officer: Frank Roy, General Manager

Senior Marketing Executive: Peter Vasarhelwi

Branches: Montreal, Ottawa, Quebec, Calgary, Vancouver, Edmonton

Size: 35 employees, annual sales between $2,000,000 and $20,000,000

Activities: California Computer Products of Canada sells interactive graphics systems, complete with computers, disc drives, plotters and work stations, for the computer-aided design marketplace. Engineering and architectural firms, as well as utilities and municipalities, are major users.

This company is the Canadian subsidiary of CALCOMP of Anaheim, California.

CALMA Interactive Graphic Systems

Suite 1700, 1 Yonge Street
Toronto, Ontario, Canada
M5E 1E5

Telephone: (416) 863-6666

Senior Marketing Executives: Jim Dinsmore
Cliff Gentle

Size: 8 employees, annual sales between $2,000,000 and $20,000,000

Activities: The Toronto office of CALMA Interactive Graphic Systems opened in August, 1980, the first Canadian office of the parent company which is based in Sunnyvale, California. The parent is a wholly-owned subsidiary of General Electric. CALMA's Canadian branch is involved in sales, system maintenance and support for CAD/CAM products produced by the parent.

CAM products include interactive graphics packages, automated numerical control (NC) tool path generation software, and postprocessors for NC machines. In the CAD field, CALMA offers a design/drafting/manufacturing software package, integrated circuit designs and mapping design systems. All these have various applications for manufacturing and consulting engineering companies with design and drafting groups.

Canada Systems Group

Multiple Access Division
885 Don Mills Road
Don Mills, Ontario, Canada
M3C 3H1

Telephone: (416) 443-3905

Chief Executive Officer: L. Parker, Vice-President and General Manager

Branches: Montreal, Ottawa, Toronto, Winnipeg, Edmonton, Calgary, Vancouver

Size: 150 employees, annual sales over $2,000,000

Activities: Originated in 1969 as Multiple Access Limited, this scientific/engineering computer service firm was acquired by Canada Systems Group. It provides consulting services, CAD computer services, structural and mechanical design, piping systems design and interactive graphics systems.

One of Canada's largest Canadian-owned computer services companies, it offers a unique blend of people expertise, user-oriented programs and super-scale scientific and commercial computing facilities (including a CYBER 720 and a CYBER 174), all available through the company's own continent-wide computer communications network.

Can-Eng Consultants Ltd.

P.O. Box 628
6800 Montrose Road
Niagara Falls, Ontario, Canada
L2E 6V5

Telephone: (416) 356-1327

Telex: 06-15108

Chief Executive Officer: A.R. Neufield, President

Senior Engineering Executive: Peter B. MacKenzie, Vice-President, Engineering

Size: 90 employees, annual sales between $2,000,000 and $20,000,000

Activities: This company provides the engineering services for products sold by Can-Eng Sales Ltd. and manufactured by Can-Eng Manufacturing Co. and Town-Applied Technology Ltd., all of which have separate entries in this directory.

See also, Can-Eng Manufacturing Co.

Can-Eng Manufacturing Co.

P.O. Box 628
6800 Montrose Road
Niagara Falls, Ontario, Canada
L2E 6V5

Telephone: (416) 356-1327

Telex: 06-15108

Chief Executive Officer: A.R. Neufield, President

Senior Engineering Executive: F.J. Oille, Vice-President, Manufacturing

Size: 90 employees, annual sales between $2,000,000 and $20,000,000

Activities: Although this company has been the Canadian representative for Prab Conveyors, Inc. of Kalamazoo, Michigan for the past six years, it has recently gained the licence to manufacture in Canada Prab's comprehensive line of robots. These robots range from the simplest to the most sophisticated.

Can-Eng Manufacturing is also involved in selling and installing PLC furnace and related systems and computerized industrial process systems.

It is one of four companies wholly-owned by Can-Eng Holding Ltd. The others, Can-Eng Sales Ltd., Can-Eng. Consultants Ltd., and Town Applied Technology Ltd. (TAT), are listed separately. All four companies are structured to provide support services to each other.

Can-Eng Sales Ltd.

P.O. Box 628
6800 Montrose Road
Niagara Falls, Ontario, Canada
L2E 6V5

Telephone: (416) 356-1327

Telex: 06-15108

Chief Executive Officer: W.L. Bamford, President

Senior Marketing Executive: John Kay, Vice-President

Size: 90 employees, annual sales between $2,000,000 and $20,000,000

Activities: Markets the products and services of Can-Eng Manufacturing Co., Can-Eng Consultants Ltd. and Town-Applied Technology Ltd. (TAT), all of which have separate entries in this directory.

See also, Can-Eng Manufacturing Co.

Canadian Drafting Systems Ltd.

6120 Second Street Southeast, Block A25
Calgary, Alberta, Canada
T2H 2J2

Telephone: (403) 259-8770

Telex: 03-822556

Chief Executive Officer: F.L. Meyer, President

Senior Marketing Executive: K.M. Dedeluic, General Manager

Branch: #23, Unit 5
151 Carlingview Drive
Rexdale, Ontario, Canada
M9W 5S4

Size: 40 employees, annual sales between $2,000,000 and $20,000,000

Activities: Based in Calgary, Canadian Drafting Systems is the second largest supplier of CAD/CAM systems to industry in Canada. With sales experience in all areas of CAD/CAM, its product line involves the Auto-Trol AD/380, which is a mini-computer-based system that uses either a Sperry Univac V-77 or a Dec VAX 11-780 system.

The company is involved in most areas of the business except for manufacturing, and its products are of interest to a wide range of customers, including those engaged in engineering, architectural, general drafting and general building construction applications.

The company is the exclusive Canadian distributor for Auto-trol Technology Corporation of Denver, Colorado. Auto-trol produces a complete turnkey system and provides hardware, software, maintenance and service

support, applications support, training facilities and on-site training for Canadian customers through its Canadian representative, Canadian Drafting Systems.

Canadian General Electric Co. Ltd.

107 Park Street North
Peterborough, Ontario, Canada
K9J 7B5

Telex: 06-962826

Power Generation Department

Senior Marketing Executive: H.C. Dickout, Vice-President and General Manager

Telephone: (705) 748-8085

Branches: 1900 Elginton Avenue
Scarborough, Ontario, Canada
M1L 2M1

390, rue Sherbrooke
Lachine (Québec) Canada

Size: approximately 3,500 employees, annual sales greater than or equal to $20,000,000

Activities: This department sells systems; designs and supplies control systems using process computers; provides nuclear reactor refuelling control systems and computerized drafting systems for electrical connections. It is also involved in the design and manufacture of robotics.

Industrial Apparatus Department

Senior Marketing Executive: Merritt Gordon, Vice-President and General Manager

Telephone: (705) 748-8080

Activities: This department provides design services for automative drive systems for products and processes.

CDE Computerized Drafting & Engineering Inc.

385 The West Mall, Suite 101
Etobicoke, Ontario, Canada
M9C 1E7

Chief Executive Officer: Ivan Copf, President

Size: 3 employees

Activities: This company, incorporated in 1980, has designed and developed its own metric software system which it is marketing as the CDE System. The system has the CAD capabilities of producing shop drawings for the structural steel industry (fabricators). The company provides training and maintenance for its CDE System customers. Also provides time-sharing services, whereby customers may use the company's inhouse CDE System, and design services.

Cincinnati Milacron Canada Limited

122 North Queen Street
Toronto, Ontario, Canada
M8Z 2E4

Telephone: (416) 233-3216

Chief Executive Officer: Bert C. Taylor, President

Activities: Provides numerical control systems, computer-controlled machining centres, technical support, minicomputers, CNC hardware, backup equipment and consulting services, and now sells and installs robotics.

Computel Systems Ltd.

112 Kent Street, 14th Floor
Place de Ville, Tower B
Ottawa, Ontario, Canada
K1P 5P2

Telephone: (613) 238-6061

Telex: 053-3619

Chief Executive Officer: E.P. Cannon, President

Activities: Provides consulting services; conducts research and development; provides computer resources for CAD/CAM; acquires and supports specific CAD/CAM packages or programs; provides terminal equipment on lease back; provides programs — econometrics, engineering, graphics and plotting, linear programing; mathematics/statistics, simulating, project management, DYNAMO program for compiling and executing continuous simulation models, SYMAP program for production of maps and diagrams which graphically depict spatially-disposed quantitative and qualitative information.

Computer Assembly Systems Ltd. (CompAS)

P.O. Box 1330
1245 California Avenue
Brockville, Ontario, Canada
K6V 5Y6

Telephone: (613) 342-5041

Telex: 066-36576

Chief Executive Officer: Hugh T. Watt, President

Senior Marketing Executive: Donald M. Clark, Vice-President and General Manager

Size: 160 employees, annual sales between $2,000,000 and $20,000,000

Activities: CompAS, established in 1973, has the largest and most highly automated independent PCB assembly operation using computer-controlled equipment in North America. The company uses two types of insertion machines: one for integrated circuits in a dual-in-line package; the other for axial lead components that have various distances between the two leads, depending on component size and location. The variable centre machines use axial lead components that have been pre-sequenced and taped by computer-controlled sequences. They are then inserted in their precise location on the printed circuit boards, cut and clinched to secure them.

The insertion machines are controlled by Digital Equipment Corporation computers driven by DEC tapes, with video monitors at the work stations to allow for rapid program review and revision.

Components that cannot be inserted automatically are prepared for manual insertion. Wave soldering, board cleaning and trimming are processed by semi-automatic facilities. The completed board is thoroughly inspected prior to shipment.

This computer-aided manufacturing service is being used by companies throughout Canada to reduce manufacturing costs and to ensure high quality assembly.

Computer Dynamics Ltd.

1652 West 8th Avenue
Vancouver, British Columbia, Canada
V6J 1V5

Telephone: (604) 736-8154

Chief Executive Officer: G. Martin Kernahan, President

Activities: From its interactive graphics service bureau in Vancouver, Computer Dynamics provides terminals on-line, at the centre and remote, for the computer-aided industry. The company provides plotting and continuous digitizing services. Applications are found in the engineering and architectural areas, as well as hydro utilities, telephone companies, cable TV and other areas involving mapping functions.

ComputerVision Canada Inc.

180 Attwell Drive, Suite 202
Rexdale, Ontario, Canada
M9W 6A9

Telephone: (416) 675-9399

Chief Executive Officer: Tod R. Rehm, Canadian Marketing Manager

Senior Marketing Executive: Greg Prentice, Canadian Technical Support Manager

Size: 14 employees, annual sales well over $2,000,000

Activities: Although the parent company, ComputerVision of Bedford, Massachusetts, has long been actively marketing in Canada, its Canadian subsidiary was officially established in late 1981. The sales and service office features complete system demonstration facilities and a spare-parts inventory.

ComputerVision is the world's largest manufacturer of computer-aided design and manufacturing systems. Its CAD/CAM systems now in use worldwide are involved in such diverse applications as aerospace, automotive, electronics, energy, mapping and typing.

The company offers a total turnkey operation, education and training, onsite technical training and operations, software and hardware support and marketing.

Control Data Canada, Ltd.

1855 Minnesota Court
Mississauga, Ontario, Canada
L5N 1K7

Telephone: (416) 826-8640

Chief Executive Officer: G. Hubbs, President

Senior Marketing Executive: W.G. Glover, Senior Vice-President

Branches: Toronto, Chalk River, Calgary, Edmonton, Halifax, Montreal, St. Laurent, Ottawa, Sainte Foy, Vancouver, Winnipeg.

Size: 2,000 employees, annual sales more than $20,000,000

Activities: Through its CYBERNET computer services network, Control Data provides a wide range of data processing assistance including over-the-counter, remote batch, and conversational time-sharing services. The company offers products and consulting services in the CAD/CAM area.

CAM products include CYBER Manufacturing Management System (CMMS), which is a comprehensive manufacturing/production control application package available on a CYBER system, or through CYBERNET services, and Manufacturing Plus, which is a similar package available through all 370 services.

In CAD, the products include CD-2000, which offers 3-D design, drafting mass properties, numerical control and surface geometry, available through CYBERNET services or Control Data CYBER services, and a large complement of engineering analysis, design, graphics and modelling application packages. Consulting services are also provided for all CAD/CAM products.

Coyne Associates Systems Consultants Limited

1010, rue Sherbrooke ouest, Suite 307
Montréal (Québec) Canada
H3A 2R7

Telephone: (514) 282-8027

Chief Executive Officer: John J. Coyne, President

Branch: Winnipeg, Manitoba

Size: 9 employees, annual sales between $250,000 and $2,000,000

Activities: Coyne Associates Systems, based in Montreal, is developing software packages for CATV system design, telephone network design, and data network optimization. The company, which provides consulting services in its areas of specialization, is working on two design products which are nearing completion.

Rural Program for Route Analysis and Design (RPRAD) is a system that generates a complete software design for the outside plant facilities of cable TV and telephone networks. Urban Program for Route Analysis and Design (UPRAD), a 20,000 line software program, is the same, but is an urban product. Although both systems are still under development, purchases and commitments from major customers have already been made.

D.G.S. Datagraphics Ltd.

18 H Enterprise Avenue
Ottawa, Ontario, Canada
K2G 0A7

Telephone: (613) 225-0411

Telex: 053-3170

Chief Executive Officer: P.J. Philliban, President

Senior Marketing Executive: G.W. Philliban, Vice-President, Marketing

Branch: 2 Robert Speck Parkway
Suite 750
Mississauga, Ontario, Canada
L4Z 1H8

Size: 5 employees, annual sales between $250,000 and $2,000,000

Activities: Supplies complete graphics software packages for computer-aided design and computer-aided photogrammetry, and addresses these products to mechanical and electrical draftsmen. The company has long supplied computer pheripherals and computer communication products, and designing systems using these products, in Canada. D.G.S. represents several manufacturers who produce graphics, display terminals, intelligent CRT terminals, digital plotters, digital printers, mini-computer systems, teletypewriter replacement CRT terminals, digitizers and digital magnetic tape mechanisms.

Digitizers, digital plotters and magnetic tape mechanisms form the basis for automated drafting systems. D.G.S. also provides installation and service.

Datamex Ltd.

14 Leswyn Road
Toronto, Ontario, Canada
M6A 1K2

Telephone: (416) 787-1208

Telex: 06-969713

Chief Executive Officer: Dan Hanuri, President

Senior Marketing Executive: Bob Arthur, General Sales Manager

Branches: 7005, chemin Kildare, Suite 6
Côte-Saint-Luc (Québec) Canada
H4W 1C1

1570 Liverpool Court, Bay #6
Ottawa, Ontario, Canada
K1S 1V8

525 Seymour Street, Suite 816
Vancouver, British Columbia, Canada
V6C 3J1

Size: annual sales between $2,000,000 and $20,000,000

Activities: Supply computer and X-ray peripherals; PCB design systems; digitizers; CRT terminals; microprocessors; B/W and colour graphics CRT display systems — low resolution and high resolution; suppliers of intelligent colour graphic systems and software.

Dataplotting Services Ltd.

160 Duncan Mill Road
Don Mills, Ontario, Canada
M3B 1Z5

Telephone: (416) 447-8518

Chief Executive Officer: Wilfred Parker, President

Activities: Dataplotting Services is a plotting service bureau that provides computer processing of geophysical data, flatbed plotting systems, and contouring packages. It also provides computerized plotting services for map production, graph production, and engineering design plotting, and designs, furnishes and installs complete production-line systems. Consulting services and research and development are also provided by the company.

DeVilbiss (Canada) Ltd.

P.O. Box 3000
Barrie, Ontario, Canada
L4M 4V6

Telephone: (705) 728-5501

Chief Executive Officer: P.B. Popp, President

Senior Marketing Executive: S.T. Sharpe, Vice-President, Marketing

Size: over 200 employees, annual sales greater than or equal to $20,000,000

Activities: Sells and services robotic manipulators for the finishing industry. It is the Canadian branch of The DeVilbiss Co. of Toledo, Ohio.

Diffracto Ltd.

6360 Hawthorne Drive
Windsor, Ontario, Canada
N8T 1J9

Telephone: (519) 945-6373

Telex: 064-77875

Chief Executive Officers: Tim Pryor, President
Omer Hageniers, Vice-President

Size: 100 employees, annual sales over $2,000,000

Activities: This company is dedicated to solving quality control problems and is a leader in the electro-optical/laser gaging and inspection field. It has complete design and build capabilities plus substantial R&D facilities to present complete turnkey packages.

Digital Equipment of Canada Limited

100 Herzberg Road
P.O. Box 13000
Kanata, Ontario, Canada
K2K 2A6

Telephone: (613) 592-5111

Chief Executive Officer: David Whiteside, President

Branches: Halifax, Quebec City, Montreal, Ottawa, Kingston, Saint John, Toronto (2 offices), London, Hamilton, Winnipeg, Regina, Saskatoon, Calgary, Edmonton, Vancouver, Victoria

Size: Over 1,600 employees, annual sales more than $20,000,000

Activities: Canada's largest manufacturer of minicomputers and a leader in time-sharing systems, Digital Equipment is also a major supplier of small, medium and large-scale computer systems, peripheral equipment, interfacing devices, software packages and support services.

Founded in 1963, this company is a wholly-owned subsidiary of Digital Equipment Corporation of Maynard, Massachusetts.

Digital Graphics Limited

90 Don Park Road
Markham, Ontario, Canada
L3R 1C4

Telephone: (416) 495-9633

Telex: 06-986843

Chief Executive Officer: Fred Long, General Manager

Senior Marketing Executive: Peter Kazarian, International Sales Manager

Size: 51 employees, annual sales between $2,000,000 and $20,000,000

Activities: Established in 1973, Digital Graphics specializes in computer-generated artwork for printed circuit boards. It was the first Canadian company to offer this service to electronic manufacturers and was one of the first North American service bureaus to use interactive computer systems for this purpose.

The company has enlarged the scope of its operations to the point where it can now provide everything from printed circuit board design layouts to finished circuit board prototypes. Along with the artwork that enables customers to produce their own circuit boards, the company will supply numerical control drill tapes, control tapes for automatic component insertion machines, and component parts list documentation, if required.

Documented Circuits Inc.

P.O. Box 8, Station A
Kingston, Ontario, Canada
K7M 6P9

Telephone: (613) 389-1032

Chief Executive Officer: Romulo Severino, President

Senior Marketing Executive: David Sprigings, Vice-President, Marketing

Size: 18 employees, annual sales greater than or equal to $250,000 but less than $2,000,000

Activities: Documented Circuits uses computer-aided design in the design of printed circuit boards which have many applications in the telecommunications industry. The company is involved in the design and manufacture of products, and it also conducts research and development in Canada.

Epic Data Industries Ltd.

Division of Ebco Industries Ltd.
7280 River Road
Richmond, British Columbia, Canada
V6X 1X5

Telephone: (604) 273-9146

Telex: 043-55701

Chief Executive Officer: Helmut Eppich, President

Senior Marketing Executive: Norm Cafik, General Manager

Branches: Epic Data Corporation
15111 Whittier Boulevard, Suite 280
Whittier, California 90603
U.S.A.

Epic Data Corporation
765 Route 83, Suite 112
Bensenville, Illinois 60106
U.S.A.

Epic Data Corporation
6 Wilcox Street
Simsbury, Connecticut 06070
U.S.A.

Size: 75 employees, annual sales between $2,000,000 and $20,000,000

Activities: Provides computerized data collection system for job costing, material control, department costing, portable inventory records.

Ex-Cell-O Corporation of Canada Ltd.

120 Weston Street
London, Ontario, Canada
N6C 1R4

Telephone: (519) 438-2133

Chief Executive Officer: R.H. Strickland, Canadian Vice-President and General Manager

Activities: Ex-Cell-O manufactures and distributes computer numerical control machine tools such as a computerized NC vertical milling machine which has many applications in the small parts manufacturing sector, the tool, die and mold industry, and in general purpose technical shops. The company also offers a computerized electronic interface that is used with special purpose machinery. Ex-Cell-O designs, furnishes and installs systems and provides consulting services.

Ferro Technique Ltd.

695, Montée de Liesse
Montréal (Québec) Canada
H4T 1P9

Telephone: (514) 341-3450

Chief Executive Officer: George Miechowsky, President

Sales Offices: 1707 Sismet Road
Mississauga, Ontario, Canada

6777 Cantelon Drive
Windsor, Ontario, Canada

Activities: Ferro sells a programing system called ENCODE that generates tapes for NC and CNC machine tools. The system includes a postprocessor. Applications for the product in the computer-aided manufacturing field are found in the metal working industry. Ferro represents other companies in distributing new CNC equipment and provides technical assistance to customers.

G.A. Computer Ltd.

7225 Woodbine Avenue
Markham, Ontario, Canada
L3R 1A3

Telephone: (416) 495-9434

Telex: 610-492-4450

Chief Executive Officer and Senior Marketing Executive: R.J. Pritchard, General Manager

Branches: 880 Lady Ellen Place
Ottawa, Ontario, Canada

4, carré Westmount, Suite 220
Montréal (Québec) Canada

255 - 1465 West 7th Avenue
Vancouver, British Columbia, Canada

Size: 40 employees, annual sales between $2,000,000 and $20,000,000

Activities: Supplies turnkey computerized control systems for industrial automation, product testing and numerical control equipment.

G.A. Thompson & Associates Limited

96 Leacock Drive
Pointe-Claire (Québec) Canada
H9R 1H1

Telephone: (514) 695-1821

Chief Executive Officer: Allan Thompson, President

Senior Marketing Executive: John Arpage, Vice-President, NC Data Systems

Size: 10 employees, annual sales about $2,000,000

Activities: This wholly-owned Canadian company provides a full CAM graphic system for CNC, NC and DNC for machining — the Elan NC Graphics System. Its total turnkey system includes hardware, software and total support. The company also manufactures and markets the Rotring H.P. plotter-pen adaptor.

G.A. Thompson provides consulting services and production value analysis for numerical control applications. It is very much involved with research and development, and maintains a full laboratory for this purpose.

Genrad Limited

307 Evans Avenue
Toronto, Ontario, Canada
M8Z 1K2

Telephone: (416) 252-3395

Chief Executive Officer and Senior Marketing Executive: R.J. Provan, President

Activities: Provides logic circuit analyzers; automatic testers.

Geophysical Service Incorporated

Subsidiary of Texas Instruments, Inc.
Digital Systems Division
280 Centre Street East
Richmond Hill, Ontario, Canada
L4C 1B1

Telephone: (416) 889-7373

Chief Executive Officer: Jim Bolin, General Manager for Digital Systems Group

Activities: Geophysical provides printed circuit board testing systems.

George J. House Associates Inc.

1 Duke Street, Suite 213
Hamilton, Ontario, Canada
L8P 1W9

Telephone: (416) 522-0235

Chief Executive Officer: George J. House, President

Activities: George J. House Associates is a consulting company that provides services in process planning, programing languages, sculptured surfaces, the economics of CAM systems, automation of manufacturing processes, NC processing, integrated management systems, computer-directed production systems, and group technology with applications in manufacturing processes.

Gross Machinery Group

18 Jarvis Street
Toronto, Ontario, Canada
M5E 1N1

Telephone: (416) 364-7161

Telex: 065-24106

Chief Executive Officer: Michael Gross, President

Senior Marketing Executive: Michael Lishnak, Vice-President, Sales

Branches: Montreal, Quebec; Edmonton, Alberta; London, Ontario; Vancouver, British Columbia; Winnipeg, Manitoba; Chicago, Illinois; Tokyo, Japan

Size: 60 employees, annual sales more than $20,000,000

Activities: Provides computer numerical control machine tools; represents Fujitsu, Hitachi-Seiki, Kotobuki Industry, Makino Milling Machine, Mitsubishi Heavy Industries, Mitsui-Seiki, Mori-Seiki, OKK, OKuma, Pratt & Whitney, Toshiba, Yoshida, Voest, Acme International, Homma Metal Works, Roku-Roku Fangyo Ltd.

Gunnar A. Jacobson Associates

785, avenue Plymouth
Montréal (Québec) Canada
H4P 1B3

Telephone: (514) 731-1156

Chief Executive Officer: Gunnar A. Jacobson

Activities: Designs, furnishes and installs complete software systems in the computer-aided design area. It also provides consulting services, conducts research and development, and offers product design-building components.

H.A. Simons (International) Ltd.

425 Carrall Street
Vancouver, British Columbia, Canada
V6B 2J6

Telephone: (604) 664-4315

Chief Executive Officer: T.A. Simons, President

Branches: Affiliate in Montreal and Atlanta, Georgia

Size: 2,000 employees

Activities: H.A. Simons is a Vancouver-based company that provides consulting engineering services, primarily to the pulp and paper industry in British Columbia. It uses computer-aided design for engineering drawings in the design of new or rebuilt pulp and paper mills.

H.G. Engineering Ltd.

260 Lesmill Road
Don Mills, Ontario, Canada
M3B 2T5

Telephone: (416) 447-5535

Telex: 06-966807

Chief Executive Officer: Dr. A. Firmin, Vice-President

Branch: H.G. Engineering Inc.
2 Executive Park Drive
North Billerica, Massachusetts 01862
U.S.A.

Size: 25 employees, annual sales between $250,000 and $2,000,000

Activities: Provides software for CAD systems; structural analysis for a wide range of products including pressure vessels, public vehicle seats and rail cars; vibration analysis; consulting services; designs and assembles software systems; represents ASAS, FESDEC, GIFTS systems.

Hewlett Packard (Canada) Limited

6877 Goreway Drive
Mississauga, Ontario, Canada
L4V 1M8

Telephone: (416) 678-9430

Chief Executive Officer: Malcolm Gissing, Canadian President and General Manager

Senior Marketing Executive: Paul Mosley, Marketing Communications Supervisor

Activities: Hewlett Packard provides programable automatic test systems for electronic circuits in the computer-aided manufacturing area. HP3000, with its materials management software package, has multi-level usage for large manufacturers while HP1000 — a shop floor computer — caters to mid to large manufacturers, and HP250 is for small manufacturers. Hewlett Packard also has graphics capabilities on its systems.

Honeywell Limited

740 Ellesmere Road
Scarborough, Ontario, Canada
M1P 2V9

Telephone: (416) 293-8111

Chief Executive Officer: Rod Bilodeau, Chairman of the Board

Branches: all over Canada

Size: 3,700 employees, annual sales more than $20,000,000

Activities: Honeywell Limited is into computer-aided manufacturing in the software area. The company designs, furnishes and installs software products to complement its own general purpose hardware and computer-assisted programs.

I.P. Sharp Associates Limited

156 Front Street West, 5th Floor
Toronto, Ontario, Canada
M5J 2L6

Telephone: (416) 364-5361

Chief Executive Officer: Ian Patrick Sharp

Senior Marketing Executive: Douglas B.H. Scott, Marketing Representative

Activities: Provides computer-aided manufacturing software for manufacturing of integrated circuits, plant facility monitoring and direct host to microprocessor control.

I.P. Sharp has developed a comprehensive set of software called PROMIS that manages the wafer processing needed to manufacture integrated circuits. The software runs on a VAX 11/780 computer with communication links to IP300 process monitoring computers. An industry standard communication link connects the VAX to microprocessors in the processing equipment.

IBM Canada Limited

1150 Eglinton Avenue East
Don Mills, Ontario, Canada
M3C 1H7

Telephone: (416) 443-2111

Chief Executive Officer: L.K. Lodge, President

Activities: IBM Canada designs and sells products and systems as well as manufactures products and provides consulting services. A major research and development company, IBM also provides numerical control programing systems, production and inventory control systems and NC programing for drafting systems.

ICAM Technologies Ltd.

997, boulevard Decarie, Suite 201
Saint-Laurent (Québec) Canada
H4L 3M7

Telephone: (514) 334-2157

Chief Executive Officer: John J. Nassr, President

Size: 10 employees, annual sales between $250,000 and $2,000,000

Activities: ICAM provides computer-aided multi-axis programing for the full range of NC/CNC machinery along with supportive documentation and manufacturing and tooling consultation. ICAM also markets and supports its own CAM time-sharing system and software, and supplies CAM training, develops post processors and graphic tutorials.

ICAM Technologies, previously incorporated under the name of Canadian Advanced Production Consultants Ltd., specializes in computer-aided programing in carrying out tape preparation services as well as programer training, management consulting and tool and fixture design for the entire range of available N/C equipment. Since federal incorporation in 1971, the company has been involved in numerous Canadian commercial and aerospace programs, such as the Canadair Challenger, Murcure II, DHC7, DC9, DC9 Super 80, DC10, L1011, 707, 747, 757, 767, F15 and the NASA Space Shuttle. In addition, the company has been providing assistance to some major United States firms in the field of CAD/CAM related management consulting and advanced part programing.

ICAM has recently made available the first Canadian-based system for use by companies wishing to easily obtain the benefits of Computer Aided Manufacturing Technology using an advanced APT time sharing capability.

In addition to part programing services, ICAM has also provided post processor software developments for many numerical control users in Canada and has built up Canada's largest post processor library to support its time sharing system.

Innovative Technology Inc.

2387 Blackstone Crescent
Ottawa, Ontario, Canada
K1B 4H3

Telephone: (613) 993-2030

Chief Executive Officer: L.G. Woolsey, President

Senior Engineering Executive: M. Thornber, Vice-President

Size: 3 employees, annual sales between $50,000 and $250,000

Activities: This company, incorporated in May, 1981, provides specialized consulting in the development and implementation of a wide variety of CAD systems, including mechanical, electrical, electronic, drafting and mapping.

Interautomation Limited

2630 Royal Windsor Drive
Mississauga, Ontario, Canada
L5J 1K7

Telephone: (416) 823-3600

Chief Executive Officer: G.S. Bagosy, President

Activities: Interautomation designs; furnishes and installs digital control systems for production-line applications including bulk weighing and conveyor systems, transfer machines, industrial furnaces and heat treating, combustion processes, production monitoring and piece counting, and continuous process control. The company designs computer control system elements and systems configured to client requirements, designs, furnishes and installs computer systems for energy conservation and management, performs computer automation for automotive engine exhaust emission testing, and designs, furnishes and installs computer systems for maintenance scheduling.

Intergraph Systems Ltd.

2020-L 32nd Avenue Northeast
P.O. Box 1946
Calgary, Alberta, Canada
T2P 2M2

Telephone: (403) 276-8631 or 277-7548

Chief Executive Officer: John A. Mostert, President

Senior Marketing Executive: Kenneth Barry, Marketing Manager

Size: 85 employees; annual sales over $18,000,000.

Branches: 9 across Canada

Activities: This company is the Canadian distributor of interactive computer graphics and data management systems produced by Intergraph Corporation (formerly M&S Computing, Inc.) of Huntsville, Alabama.

The company is involved in the sale, installation and support of interactive graphics systems to meet the needs of engineers, architects, mapping agencies, and manufacturers for the improvement of productivity, cost reduction and to add a new dimension to the application of management and graphics. More than 50 systems have been installed in Canada in the past five years covering a wide range of applications in oil and gas, utilities, forest cover and land use mapping, cartographic mapping, plant design, environmental mapping and municipal mapping.

All training of customers is done prior to delivery of their new system at one of two training centres located in eastern and western Canada. In addition, the company offers application consulting for its customers.

The company also develops customized software for CAD/CAM systems.

International Cutting Tools

Division IMW Industries Inc.
10833, Place Moisan
Montréal (Québec) Canada
H1G 4N6

Telephone: (514) 324-3720

Telex: 05-828658

Chief Executive Officer: Al Minicozzi, President

Senior Marketing Executive: Gus Minicozzi, Vice-President Marketing

Size: 65 employees, annual sales between $2,000,000 and $20,000,000

Activities: Uses NC and CAM to produce cutting tools, particularly end mills. Has developed new end mill design, patented in 10 countries, in demand by aircraft industry. Approximately 75 per cent of the company's products are exported, mainly to the United States.

James W. Stevenson & Company Limited

2000 Ellesmere Road
Unit #8
Scarborough, Ontario, Canada
M1H 2W4

Telephone: (416) 438-6967

Chief Executive Officer: James W. Stevenson, President

Activities: James W. Stevenson provides automatic precision drafting installations, digimeter mensuration appliances, and co-ordinate measuring equipment.

Kehler Computer Services Inc.

1822 West 2nd Avenue
Vancouver, British Columbia, Canada
V6J 1H9

Telephone: (604) 733-7317

Telex: 04-508764

Chief Executive Officer: Eric G. Kehler, President

Senior Marketing Executive: Kenneth J. Wharton, Marketing Manager

Size: 15 employees, annual sales between $250,000 and $2,000,000

Activities: Conducting R & D on interactive computer graphics applications for architectural CAD systems. The company expects to be able to offer turnkey systems based on Motorola 68000 microcomputers having capabilities equivalent to existing minicomputers.

It is also developing techniques for the use of geometric modelling in integrated building design, and extensible database support. Currently selling model 6809 microcomputers in conjunction with own software for accounting and similar business functions.

Kom Lynn & Associates Ltd.

849 Homer Street
Vancouver, British Columbia, Canada
V6B 2W2

Telephone: (604) 687-2400

Chief Executive Officer: D.J. Lynn, President

Size: 5 employees, annual sales between $50,000 and $250,000

Activities: Consulting industrial engineers, specializing in material handling systems, layout and design of facilities, specification of equipment, methods and procedures.

MDDC Systèmes Ltée/Ltd.

75, boulevard Hymus
Pointe-Claire (Québec) Canada
H9R 1E2

Telephone: (514) 697-3307

Telex: 05-823516

Chief Executive Officer: K.L. Lukanovich, President

Senior Marketing Executive: J.M. Longworth, Vice-President

Branch: John D. Aiken
48 Belair Drive
St. Catharines, Ontario, Canada
L2N 6X9
Tel: (416) 934-6694

Size: 30 employees, annual sales between $2,000,000 and $20,000,000

Activities: Specializing in the design and supply of mini and micro computer-based systems for the pulp and paper industry. Applications range from order and work-in-process control through wrap line control and labelling; laboratory data collection, display and reporting; paper machine simulation; construction program scheduling. Company designs and builds its own interfaces and selects other manufacturers' computers and peripherals to provide the optimum turnkey systems throughout Canada, the United States, Europe and South America. Clients include Abitibi-Price, Crown Zellerbach, Midtec Corp., Papeles Venezolanos, Reed Ltd., and Spruce Falls Power and Paper.

Manufacturing Data Systems International — Canada Ltd.

6711 Mississauga Road, Suite 501
Mississauga, Ontario, Canada
L5N 2W3

Telephone: (416) 821-3400

Chief Executive Officer: K. Stephenz, President

Senior Marketing Executive: D.E. Burnett, Managing Director

Branches: Montreal, Toronto, Vancouver, Stratford

Size: 11 employees, annual sales between $2,000,000 and $20,000,000

Activities: An international organization with headquarters in Ann Arbor, Michigan, this company designs and manufactures computer-based systems for NC/CNC part programing, manual part programing; computer-aided manufacturing; information storage and retrieval (CODE™); drafting (COMDRAW IV™); process planning (COMCAPP V™); job costing, estimating and general accounting (COMSHOP V™). The simplest COMPACT I™ system for manual part programing includes built-in calculator, formatter for automatically setting axis conventions and NC instructions, NC editor, graphic plotter for part proving, and the MDSI 200 expandable microprocessor. For more complete NC/CNC programing the MDSI 200 can be used as a data terminal and reader/punch for the COMPACT II® part programing language on the MDSI international time-sharing network or on in-house systems of the MDSI 300 or MDSI 400 series — versatile minicomputer systems with disc drives and a selection of terminals for industrial applications. Services include training programs for customers' personnel.

McDonnell Douglas Canada Ltd.

P.O. Box 6013
Toronto AMF, Ontario, Canada
L5P 1B7

Telephone: (416) 677-4341

Chief Executive Officer: Everett Reece, Vice-President and General Manager for Canada

Branch: Ottawa, Ontario

Size: 4,500 employees, annual sales more than $20,000,000

Activities: McDonnell Douglas Canada is getting more involved in the CAD/CAM area. The parent company, McDonnell Douglas Corporation in St. Louis, Missouri, markets products in the Canadian marketplace that involve computer-aided design technology, and the

Canadian subsidiary does systems development work for computer-aided manufacturing activities, such as in computer graphics.

Mimik Ltd.

P.O. Box 670
Cambridge, Ontario, Canada
L6J 1J8

Telephone: (519) 621-8010

Telex: 069-59430

Chief Executive Officer: L.S. Magor, President

Senior Marketing Executive: R.C. Isaac, General Manager

Branches: Mimik Tracers Inc., East Aurora, New York
Mimik of California, Paramount, California

Size: 75 employees, annual sales between $2,000,000 and $20,000,000

Activities: In business for more than two decades, Mimik Ltd. is known internationally for its hydraulically operated tracer units. Attached to lathes, vertical mills or boring machines, these units enable the machine to follow the contours of a master template without operator guidance. The Universal Tracer originated by Mimik is designed for maximum versatility of application and variety of workpieces, involving anything from simple stepped shafts to complex internal contours. Accuracies close to 0.0001 in. can be maintained.

Datadrive is a radically new, company-developed form of NC drive using a digital, closed loop linear actuator. It can be retrofitted to older machines or supplied already fitted to the preferred Hardinge HC. Any open or closed loop tape control, as provided by a variety of manufacturers, is compatible, using point-to-point, straight line or continuous path as required.

Moog Hydra-Point Canada Ltd.

5572 Ambler Drive
Mississauga, Ontario, Canada
L4W 2K9

Telephone: (416) 624-1452

Chief Executive Officer: Ken Nunn, President and General Manager

Activities: Moog Hydra-Point provides sales and service centres for CNC-compatible numerically-controlled machines, and numerically-controlled machines. The Mississauga-based company sells and services and is now developing sales and service centres for DNC-compatible NC machines. Its products are manufactured by Hydra-Point Division of Moog Inc., East Aurora, New York.

Moore Brothers Machinery Co. Ltd.

9701, chemin Côte de Liesse
Dorval (Québec) Canada
H9T 1A3

Telephone: (514) 631-9894

Chief Executive Officer: C.E. Moore, President

Branch: 51 Six Point Road
Islington, Ontario, Canada
M8Z 2X3

Activities: This Montreal-based company provides numerical control machine tools and machining centres, as well as computer NC profiling equipment and computer NC production milling machines. Moore also offers consulting services.

Nordson Canada Ltd.

849 Progress Avenue
Scarborough, Ontario, Canada
M1H 2X4

Telephone: (416) 438-6730

Chief Executive Officer: R. MacInnes, Vice-President and General Manager

Branch: 5875, rue Bessette
Saint-Laurent (Québec) Canada

Size: over 40 employees, annual sales greater than or equal to $250,000 but less than $2,000,000

Paint Finishing Division

Senior Marketing Executive: R. Beauchamp, Manager

Activities: This company is the Canadian arm of Nordson Corp. of Amherst, Ohio, which produces robotics dedicated to the application of coating materials. This company sells, services and provides training for its products. Also available are painting systems that incorporate computerized systems.

Norpak Limited

10 Hearst Way
Kanata, Ontario, Canada
K2L 2P4

Telephone: (613) 592-4164

Chief Executive Officer: Mark M. Norton, President

Senior Marketing Executive: Gordon W. Thorgeirson, Vice-President, Marketing

Branch: P.O. Box 70
Pakenham, Ontario, Canada
K0A 2X0

Size: 260 employees, over $20 million in annual sales

Activities: Norpak products include interactive computer graphics and image-processing systems, EQ subsystems, process control and computer-aided design (CAD/CAM) systems for industrial and commercial use. The company develops, designs and manufactures the display generator component for CAD/CAM systems. Its most well-known CAD product is SuperVISION.

Northern Engineering Industries Canada, Limited

121 Industry Street
Toronto, Ontario, Canada
M6M 4M3

Telephone: (416) 762-3661

Chief Executive Officer: Barry Hercus, President

Branches: Montreal, Toronto, Calgary, Vancouver

Size: 1,300 employees, annual sales more than $20,000,000

Activities: Northern Engineering Industries, a Canadian company, has CAD/CAM interests through its two wholly-owned companies, Ferranti-Packard Transformers and Ferranti-Packard Electronics. The company designs, manufactures and sells transformer products that are computer designed. Primary utilities and heavy industry are large customers of the transformers. Northern Engineering has purchased software packages to start getting involved in CAM in the future.

Omnitech Graphic Systems Inc.

City Centre Building, 5th Floor
880 Wellington Street
Ottawa, Ontario, Canada
K1R 6K7

Telephone: (613) 232-1747

Chief Executive Officer: David Morley, President

Branch: South Centre Executive Tower
11012 MacLeod Trail South, Suite 565
Calgary, Alberta, Canada
T2J 6A5
Telephone: (403) 278-4501

Distributor: TDC Graphics
80 Royal Crescent Road
Rexdale, Ontario, Canada
M8V 4C1
Telephone: (416) 749-3970

Size: 33 employees, annual sales greater than or equal to $2,000,000 but less than $20,000,000

Activities: This company, specializing in computer-aided design, drafting and manufacturing systems, has developed an advanced standalone, interactive CAD/CAM graphic system. In fact, it is a fully-integrated computer graphics solution company.

The Omnitech TM-1 computer-aided design and drafting system is a hardware and software turnkey package for various engineering applications where interactive graphics and computer-aided design can increase engineering drafting output and control. The Omnitech basic software package, known as SYMBOL, is concerned with optimizing the operator-machine interface.

In addition, the company provides a complete range of CAD/CAM support services to its customers, such as engineering applications advice, engineering applications software, systems manuals and documentation, training, and maintenance.

Offices will open in Montreal and Vancouver in early 1982.

Orcatech Inc.

2680 Queensview Drive
Ottawa, Ontario, Canada
K2B 2H6

Telephone: (613) 820-9602

Telex: 053-3868

Chief Executive Officer: David J. Pearson, President and Vice-President, Marketing

Senior Operations Executive: Girvan L. Patterson, Vice-President, Operations

Size: 10 employees, annual sales between $250,000 and $2,000,000

Activities: Manufactures and sells design engineering workstations specifically for the CAD/CAM and scientific environments. These workstations feature high resolution graphics screens, powerful local computing capabilities for running large complex applications within the terminal itself, and a complete set of graphics and operating system software to support application development and execution.

The workstation can operate in a stand-alone mode — in a cluster or loop with other units — or as a front end intelligent graphics processor to a larger mainframe.

The primary market for these terminals will be the developers of CAD/CAM systems who are looking for a highly cost-effective vehicle for their systems.

Pavesi International Ltd.

3507 Mainway
Burlington, Ontario, Canada
L7M 1A9

Telephone: (416) 335-6012

Chief Executive Officer: Gary Smith, President

Size: 12 employees, annual sales greater than $50,000 but less than $250,000

Activities: This company, incorporated in 1980, designs robotic systems for industrial uses. It is the Canadian representative for robots produced by General Numeric Corp., Elk Grove (Chicago), Illinois and Seiko Instruments, Inc., Torrance, California.

Perkin-Elmer (Canada) Limited

Data Systems Division
6486 Viscount Road
Mississauga, Ontario, Canada
L4V 1H3

Telephone: (416) 677-8990

Telex: 06-968-514

TWX: 610-492-9372

Chief Executive Officer: Albert Pinshas, General Manager and National Sales Manager

Senior Engineering Executive: Bob Watson, National Service Manager

Branch Offices: Calgary, Ottawa, Toronto, Montreal and Vancouver

Size: 56 employees; annual sales between $2,000,000 and $20,000,000

Activities: This company is the Canadian subsidiary of Perkin-Elmer Corporation of Norwalk, Connecticut. It markets and services CAD/CAM products with applications for mechanical engineering — two software packages, AD2000 and CADAM — and electronics (printed circuit boards, automatic component insertion). It offers a complete range of support services, training on site and in scheduled classrooms, as well as custom programing. Perkin Elmer's NIPS package addresses manufacturing resource planning.

Phoenix Automation, Inc.

100 Argyle Avenue
Ottawa, Ontario, Canada
K2P 1B6

Telephone: (613) 233-7777

Telex: 053-4890

Chief Executive Officer: H. Murray Shantz, President

Senior Marketing Executive: Robert Copeland, Sales Manager

Senior Engineering Executive: Brian Woolsey, Vice-President, Operations

Size: 14 employees, annual sales greater than or equal to $2,000,000 but less than $20,000,000

Activities: This company sells, services and designs systems for the CAD/CAM Turnkey System and Smart Pencil Drafting manufactured by its wholly-owned subsidiary, Phoenix Graphics Ltd. (see below). The company also sells and supports all major lines of plotters and other CAD/CAM peripherals.

Phoenix Automation is the parent company of two wholly-owned subsidiaries:

Phoenix Automation U.S

Located in Boston, Massachusetts this company sells the services and products available from Automation, Inc. and Phoenix Graphics Ltd.

Phoenix Graphics Ltd.
100 Argyle Avenue
Ottawa, Ontario, Canada
K2P 1B6

Telephone: (613) 233-7777

Chief Executive Officer: H. Murray Shantz, President

Activities: This company has designed and produced the Smart Pencil computer-aided drafting system and the CAD/CAM Turnkey System. In addition to manufacturing these two innovative products, it is very much involved in the research and development of more new products.

Port Weller Dry Docks

P.O. Box 3011
St. Catharines, Ontario, Canada
L2R 7C1

Telephone: (416) 934-2581

Telex: 061-5136

Chief Executive Officer: A.N. Elliott, Senior Vice-President

Senior Marketing Executive: W.W. Allan, Technical Manager

Size: 700 employees, annual sales more than $20,000,000

Activities: Undertakes numerically controlled plasma arc and oxy/fuel cutting of steel plate, ferrous and non-ferrous sheet for shipbuilders, steel service industry and others. Utilizes auto-nest program, and operates in-house computer graphics system for lines fairing and similar design applications. Method of producing NC tapes is considered much more economical than other less highly automated NC systems.

Procom Systems & Computations Limited

1010 ouest, rue Sainte-Catherine, Suite 401
Montréal (Québec) Canada
H3B 1G2

Telephone: (514) 866-3150

Telex: 05-268812

Chief Executive Officer: J. Gordon German, President

Senior Marketing Executive: D.M. Craig, Vice-President and General Manager

Size: 5 employees, annual sales greater than $50,000 but less than $250,000

Activities: This company provides engineering computation services for marine industries. Using computer programs which it has developed specifically for these purposes, Procom performs engineering calculations for consulting naval architects, shipowners and shipbuilders. These calculations can range all the way from the design of hull form and shell plates with three-dimensional curvature to the distribution of cargo in a ship for maximum safety at sea.

Project Techniques Ltd.

P.O. Box 658
Richmond, Ontario, Canada
K0A 2Z0

Telephone: (416) 838-5161

Chief Executive Officer: R. Allum, President

Senior Engineering Executive: R. Ward, Vice-President, Engineering

Size: 10 employees; annual sales between $250,000 and $2,000,000

Activities: This company provides consulting services, develops and markets its own software for printed circuit board design and IC design (CAD).

RMT Engineering Ltd.

R.R. #1
8th Avenue South
St. Catharines, Ontario, Canada
L2R 6P7

Telephone: (416) 937-1550

Chief Executive Officer: Douglas M. Pickard, President

Size: 3 employees; annual sales over $250,000

Activities: Incorporated in 1981, RMT specializes in robotics and manufacturing technology. It provides engineering services to companies interested in the use of industrial robots and systems design and debugging.

SMT-Pullmax (Canada) Ltd.

505 Iroquois Shore Road, Unit #9
Oakville, Ontario, Canada
L6H 2R3

Telephone: (416) 845-3151

Telex: 06-982242

Chief Executive Officer: C. Bandi, President

Senior Marketing Executive: Robert P. Epps, Product Manager, SMT Division

Branches: Montreal, Calgary

Size: 15 employees, annual sales between $2,000,000 and $20,000,000

Activities: Provides computer numerical controlled machine tools and computerized part changers.

Screw Machine Services Limited

31 Beverly Hills Drive
Downsview, Ontario, Canada
M3L 1A2

Telephone: (416) 249-7985

Telex: 06-965549

Chief Executive Officer: Harvey I. Collison, President

Senior Marketing Executive: David C. Collison, General Manager

Branch: Montreal, Quebec

Size: 20 employees, annual sales between $2,000,000 and $20,000,000

Activities: Provides direct numerical control and computer numerical control machining systems, including NC turning machines to 1 inch bar diameter manufactured by Star (Japan) and precision boring machines by New Britain (Connecticut).

Sperry Univac Inc.

55 City Centre Drive
Mississauga, Ontario, Canada
L5B 1M4

Telephone: (416) 270-3030

Telex: 06-961371

Chief Executive Officer: J. Coady, President

Senior Marketing Executive: M. Spratt, Director, Marketing

Branch Offices: Vancouver, Calgary, Edmonton, Regina, Winnipeg, London, Windsor, Kitchener, Burlington, Mississauga, Toronto, Scarborough, Ottawa, Montreal, Halifax, Saint John, St. John's.

Branch Plants: Winnipeg, Montreal

Size: about 1,400 employees, annual sales greater than $20,000,000

Activities: This company, which is the Canadian subsidiary of Sperry Univac Inc. of Blue Bell, Pennsylvania, designs and manufactures CAD/CAM products and systems, provides consulting services and conducts research and development. Its 1100 Series has a variety of applications — in CAD: graphical pre and post processors for structural analysis, engineering structural analysis; — in CAM: language for the computer-assisted part programing of objects, manufacturing control system software, shop floor control, data collection and activity reporting system.

Systemhouse Ltd.

99 Bank Street, 3rd Floor
Ottawa, Ontario, Canada
K1P 6B9

Telephone: (613) 236-9734

Telex: 053-4305

Chief Executive Officer: J.R. Davies, President

Senior Marketing Executive: F.T. Watts, Vice-President Marketing

Branches: Ottawa, Halifax, Montreal, Toronto, London, Winnipeg, Calgary, Edmonton, Vancouver and Washington, D.C.

Size: 675 employees, annual sales greater than or equal to $20,000,000

Activities: The Graphics Division provides professional consulting services to solve problems in the manipulation of geographically referenced data using computer-assisted cartography. The company has designed and supplied several map production systems, including Automap — a cartographic system using interactive graphics for the automated production of topographic, planimetric and thermal maps; Autochart — for production of nautical charts; and Autoplot — a universal analytical stereo plotter system which provides precision photogrammetric facilities for commercial and government users. The company has introduced a new computer-aided design and drafting turnkey system.

Teklogix Ltd.

1199 Fewster Drive
Mississauga, Ontario, Canada
L4W 2A9

Telephone: (416) 625-5673

Chief Executive Officer: J.R. Coutts, President

Activities: Provides computerized material handling systems, sorting systems, conveyor systems, and distribution systems, with emphasis on process control aspects. Provides real-time inventory control systems for production line optimization. Computer-based systems include aggregate management and waste disposal management, using weigh scale inputs; baggage sortation; product sorting using optical scanning of product codes.

The company has developed and introduced Tekscan 80, a wireless communications terminal for mobile material handling equipment to provide on-line inventory control through access to computer data base.

Tektronix Canada Inc.

P.O. Box 6500
50 Alliance Boulevard
Barrie, Ontario, Canada
L4M 4V3

Telephone: (705) 737-2700

Telex: 06-875672

Chief Executive Officer: Warren Clark, General Manager and Vice-President

Senior Marketing Executive: Jack Woida, Marketing Support Manager

Senior Engineering Executive: Dennis Kukulsky, National Sales Manager

Branches: Dartmouth, Montreal, Ottawa, Toronto, Winnipeg, Calgary, Edmonton, Vancouver

Size: 100 employees, annual sales greater than or equal to $20,000,000

Activities: Direct distributor of equipment manufactured by parent company in Beaverton, Oregon, including programable desk top computers with graphics displays, and graphics-oriented software; graphics terminals using bi-stable storage, large-screen high

resolution, or raster scan technology, with colour graphics capabilities; hard copy graphics devices including plotters; and software to drive all graphics.

Town Applied Technology Ltd. (TAT)

P.O. Box 628
6800 Montrose Road
Niagara Falls, Ontario, Canada
L2E 6V5

Telephone: (416) 356-1327

Telex: 06-15108

Chief Executive Officer: W.L. Bamford, President

Size: 90 employees, annual sales between $2,000,000 and $20,000,000

Activities: Markets and provides the engineering and installation services for computerized energy conservation systems.

See also, entry for Can-Eng Manufacturing Co.

Upton Bradeen & James Limited

30 Railside Road
Don Mills, Ontario, Canada
M3A 1A5

Telephone: (416) 445-7660

Telex: 06-966669

Chief Executive Officer: Thomas A. Breckles, President and General Manager

Branch: 5900, rue Vanden Abeele
Saint-Laurent (Québec) Canada
H4S 1R9

Size: 60 employees, annual sales more than $20,000,000

Activities: Provides computer numerical control machine tools; designs, furnishes and installs complete production-line systems tailored to customer needs; provides consulting services; represents the following international machine tool manufacturers in the field of computer numerical control equipment: Autonumerics, Boerhringer, Cincinnati Gilbert Machine Tool, Cincinnati Inc., Farrell, G.A. Gray, Hillyer, New England Machine & Tool, Paul Ferd. Peddinghaus, Tiefbohr-Tecknik, Wohlenberg.

Vadeko International Inc.

718 Wilson Avenue, Suite 502
Downsview, Ontario, Canada
M9L 2R8

Telephone: (416) 821-3222

Chief Executive Officers: Graham Whitehead, President
Henk van Deudekom, Vice-President

Senior Marketing Executive: Zev Hurshtal, Research and Development Director

Senior Engineering Executive: H. James Taylor, Chief Engineer

Size: 6 members, sales between $250,000 and $2,000,000

Activities: Designs industrial robot systems and offers application engineering services to clients. The company is under contract with the National Research Council, for example, to design a Canadian industrial robot system, and holds consulting contracts with both government and private sector clients.

Vadeko plans to enter the manufacturing field with sensors and control systems for industrial robots.

Viditon Corporation Ltd.

See entry for Ahearn & Soper Ltd.

W.R. Davis Engineering Limited

1481 Cyrville Road
Ottawa, Ontario, Canada
K1B 3L7

Telephone: (613) 746-3760

Chief Executive Officer: W. Roland Davis, P. Eng., President

Branch: 201-2160 Springer Avenue
Burnaby, British Columbia, Canada
V5B 3M7

Size: 30 employees, annual sales between $250,000 and $2,000,000

Activities: Designs products and/or systems; provides consulting services; conducts research and development; analyzes and designs rotating machinery; designs vehicle body test structures; analyzes vibration and acoustics problems; carries out computer modelling of complex mechanical systems; designs data acquisition and process control systems.

Waterloo Region Shoe Manufacturers Ltd.

c/o Conestoga College
Doon Valley Drive
Kitchener, Ontario, Canada

Telephone: (519) 653-7510

Chief Executive Officer: D.G. MacLean, Chairman

Senior Marketing Executive: D. Walters, Manager

Size: 2 employees, annual sales between $50,000 and $250,000

Activities: Produces computer tapes for shoe pattern grading, using digitizing table to plot pattern and computer program to generate information on full range of sizes. Developing computer-controlled die bending for shoe industry, and studying applications to textile and similar industries.

Westinghouse Canada Inc.

Electronic Systems Division
P.O. Box 5009
777 Walker's Line
Burlington, Ontario, Canada
L7R 4B3

Telephone: (416) 528-8811

Telex: 061-8409

Chief Executive Officer: E.M. Hepburn, Division Manager

Senior Marketing Executive: H.J. Merritt, Manager, Marketing and Business Development

Size: 350 employees, annual sales more than $20,000,000

Activities: Provides CRT displays, Linatrol optical line tracers.

Williams & Wilson Limited

544, rue Inspector
Montréal (Québec) Canada
H3C 2K9

Telephone: (514) 886-2851

Chief Executive Officer: Michael Boyne, President

Size: over 300 employees, annual sales greater than or equal to $20,000,000

Central and Western Division
4570 Sheppard Avenue East
Scarborough, Ontario, Canada
M1S 4K2

Telephone: (416) 298-8731

Senior Marketing Executive: R. (Bob) MacFarlane, Vice-President and General Manager

Branches: Edmonton, London, Windsor, Hamilton

Eastern Region
544, rue Inspector
Montréal (Québec) Canada
H3C 2K9

Telephone: (514) 886-2851

Senior Marketing Executive: Gerry Poirier, General Manager

Branches: Ottawa, Arvida, Labrador City, Sept Iles

Activities: Through its Machine Tools department, this company sells CNC products and systems, conducts research and development, and represents several manufacturers of machine tools and computer-controlled machining centres. Through its Industrial Supply department, Williams & Wilson markets Mini-Treave produced by Lyon Metal, Inc. of Chicago, Illinois, a computer-controlled storage and retrieval system.

ASSOCIATIONS AND SOCIETIES

CAD/CAM Technology Advancement Council

Contact: CAD/CAM Technology Advancement Secretariat
c/o Technology Branch (61)
Department of Industry, Trade and Commerce
235 Queen Street
Ottawa, Ontario, Canada
K1A 0H5

Telephone: (613) 593-7861

Activities: Recognizing the important contribution that CAD/CAM technology can make to improving the productivity and efficiency of the Canadian manufacturing industry, the Department of Industry, Trade and Commerce established the CAD/CAM Technology Advancement Council in 1978. The purpose of the Council, which comprises representatives from industry, educational institutions and the federal government, is to facilitate the use and application of the technology through the provision of advice and information to industry, educational institutions and government. The Council in 1980 issued a major report entitled "Strategy for Survival". It participates in seminars and conferences in conjunction with others, and distributes a monthly newsletter which is available on application to the Council secretariat.

Canadian Advanced Technology Association

Suite 310, 130 Slater Street
Ottawa, Ontario, Canada
K1P 6E2

Telephone: (613) 236-6550

Chief Executive Officer: Robert S. Long, Executive Director

Activities: The Canadian Advanced Technology Association (CATA) is an industry association representing Canadian-owned and controlled advanced technology enterprise in all fields of technology including CAD/CAM hardware, software and services. It is dedicated to improving the economic climate for the development of these companies and is organized to maximize the effectiveness of this industry sector in its relations with others, especially government and the financial community. Its committee structure provides for technology committees, i.e., a forum for the interaction of member companies engaged in CAD/CAM supply.

Canadian Industrial Computer Society (CICS)

c/o 12 Kindle Court
Ottawa, Ontario, Canada
K1J 6E2

History: The Canadian Industrial Computer Society (CICS) is an outgrowth of the National Research Council's Associate Committee on Automatic Control (ACAC) which was formed in 1959.

CICS was created in order to meet the needs of a growing group of professionals involved with the use of computers in the design and manufacture of products or the control of processes. It attempts to review the rapidly growing body of knowledge created by digital technology, to focus on those techniques and components which would be of most interest to its members and to encourage information exchange about them among its members.

Objectives: To advance the theory and practice of computing and control in industry, particularly in applications involving the computer-aided design and manufacture of products and the on-line sensor-based computer control of processes, by focussing on the hardware and software skills required by the industrial computer practitioner.

Mechanisms:
- Holding meetings and conferences for the presentation of papers on the theories and techniques of industrial computer systems.
- Promoting the exchange of information among members using the "CICS bulletin AC11".
- Publishing technical information and other news.
- Collaborating with educational institutions and other interested groups for the promotion of appropriate education and training.
- Establishing and maintaining connections with similar organizations in other countries.
- Arranging Canadian participation at national and international conferences concerned with industrial computer systems.
- Fostering the formation of local sections and assisting them in providing local membership benefits.
- Providing a national source of information about and representation of industrial computer interests.

Qualifications: Membership is open to all who are or have been professionally engaged in the use of computers in an industrial environment and who meet

certain minimum requirements. Associate membership is open to anyone interested in the aims of the society. Dues are $15.00 per year for both classes.

Canadian Institute of Steel Construction

300-201 Consumers Road
Willowdale, Ontario, Canada

Telephone: (416) 491-4552

Telex: 06-986547

Contact: H.A. Krentz, President
M.I. Gilmor, Manager of Engineering

Activities: Develops and promotes computer programs for the design of steel structures using the appropriate Canadian specifications. These programs, generally used by structural engineers, select the steel members to be used in the structure. Provides computer-user seminars and user manuals; information and support for computer programs for design and steel structures.

Canadian Portland Cement Association

116 Albert Street, Suite 609
Ottawa, Ontario, Canada
K1P 5G3

Telephone: (613) 236-9471

Chief Executive Officer: Lance C. DeCory, President

Activities: Provides computer programs for the design of concrete structures. Information regarding the program is available from the headquarters office.

Canadian Shipbuilding and Ship Repairing Association

801-100 Sparks Street
Ottawa, Ontario, Canada
K1P 5B7

Telephone: (613) 232-7127

Telex: 053-4848

Contact: Henry M. Walsh, President

Activities: Supports its members' efforts to improve efficiency through the introduction of more automated procedures and equipment. Distributes CAD/CAM newsletter to members who are interested, reviews CAD/CAM articles in various magazines and publications and sends copies to members. There is a continuing campaign by the CSSRA office to have members introduce CAD/CAM technology into its operations.

National Computer Graphics Association of Canada

191 Sherbourne Street, Suite 1611
Toronto, Ontario, Canada
M5A 3X1

Telephone: (416) 928-1397

Contact: David J. Eady, President

Activities: This association was formed in 1981 to meet two key objectives — to provide a national forum for computer graphics managers, users, consultants, vendors, and researchers to come together for discussion, education, and furtherance of common goals; — to increase awareness and to advance the use of computer graphics. To this end, the association plans to serve as a national information resource for computer graphics and related fields, including appropriate publications, education and training programs, and sponsored conferences and exhibitions.

The association publishes *IEEE/NCGA Magazine* which features computer graphics and its applications and a monthly newsletter, holds bi-monthly dinner meetings with a program, and an annual conference.

Numerical Control Society

519 Zenith Drive
Glenview, IL 60025, U.S.A.

Telephone: (312) 297-5010

Contact: Ron Hunt, Executive Vice-President

Activities: There are three Canadian chapters, in Central Ontario, British Columbia and Montreal. This is a technical organization contributing to the application and advancement of numerical control technology in all industry. It provides a central information source and information exchange, and serves as a focal point for the exploration of new ideas in the profitable and productive use of numerical control.

Each year the society conducts an annual meeting and technical conference as well as national conferences, regional seminars, chapter meetings and co-operative programs with secondary schools and colleges. It offers correspondence courses, including basic NC part pro-

graming, APT part programing, and NC co-ordinator courses. Other activities include special seminars, maintenance of a speakers registry, conducting technical surveys such as the Post-processor Survey and Industrial Survey on numerical control input (preparation and verification methods).

Publications available from the society include its monthly newsletter devoted exclusively to numerical control; a directory of NCS members; edited bound volume of the AMTC Conference Proceedings including more than 70 papers on numerical control; a guide to publications available on NC technology; a list of informative audio visual presentations.

In addition, membership in NCS allows members preferential fees and other benefits with the following organizations:

AIIE - American Institute of Industrial Engineers
GAMI - French Numerical Control Society
SANCS - South African Numerical Control Society
IMMS - International Material Management Society

For further information please contact:

Montreal
Rene Wenker
Williams & Wilson Limited
544, rue Inspector
Montréal (Québec) Canada
H3C 2K9
Telephone: (514) 866-2851

Central Ontario
Theo Giliam
Arpeco Engineering Co.
5265 Creekbank Road
Mississauga, Ontario, Canada
L4W 1N3
Telephone: (416) 625-7044

British Columbia
Doug Dark
National Research Council
Engineering Library
3904 West 4th Avenue
Vancouver, British Columbia, Canada
V6R 1P5

RESEARCH ORGANIZATIONS

British Columbia Research Council

Management Services Division and
Division of Engineering Physics
3650 Wesbrook Mall
Vancouver, British Columbia, Canada
V6S 2L2

Telephone: (604) 224-4331

Telex: 04-507748

Chief Executive Officer: Dr. V.A. Mode, Executive Director

Contacts: W.D.R. Thomas and K. McPherson, Systems Engineers, Management Services Division

Activities: Finite element stress analysis, stress analysis design of space-frame structures; analysis of submerged cables, and towed bodies in water, both surface and submerged; motion-compensating cranes; simulation of mechanical/hydraulic control systems; problem analysis and feasibility studies; engineering, including mechanical, hydraulic, electronic, and optical systems; manufacturing and material testing; model testing of ocean systems — ships, submersibles; highway scanners and photologging systems.

In 1970, the British Columbia Research Council established a development company, Techwest Enterprises Ltd. to provide a means of moving research products from B.C. Research into the marketplace and for undertaking design and manufacture of novel sophisticated equipment.

A number of successful developments have been completed, including heave compensating cranes, constant-tension winches and highway route scanners.

Canadian Institute of Metalworking (CIM)

c/o McMaster University, TB13
1280 Main Street West
Hamilton, Ontario, Canada
L8S 4K1

Telephone: (416) 528-2777

Contact: J.E. Crozier, Vice-President and General Manager

Activities: The CIM is a unique, profit motivated Canadian service facility affiliated with McMaster University. It was established in 1971, through financial assistance from the federal Department of Industry, Trade and Commerce to provide a service to the Canadian metalworking community in the application of Numerically Controlled (NC) machine tools, Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) equipment. Since 1975, CIM has been a self-sustaining entity.

CIM undertakes training of industry personnel to provide maximum utilization of plant NC/CAM equipment. Interactive group workshops lasting from one to five days are regularly scheduled and special individual company programs, held either at CIM or on company premises, can be tailored to suit individual requirements.

Studies of plant manufacturing techniques, analysis of equipment processes and procedures, and recommendations to industry concerning updating to new equipment and methods can be provided on request. When specific gains in productivity are envisioned in the theoretical analysis, the selected components may actually be manufactured using CIM's own machine tools to verify the results obtained in the theoretical process.

Because investment in new capital equipment must be the foundation for future profitability in a company, CIM offers assistance in analyzing machine requirements and establishing specifications for the equipment. Upon receipt of vendor proposals, CIM will assist in comparing responses to the specifications.

CIM has a well equipped NC machine shop for development and overload machining. The Cincinnati Hydrotel, Costomatic precision profiler and the Ex-Cell-O 603 provide a full range of milling capabilities. In addition, the Standard Modern 2060 Lathe provides an excellent vehicle for turning work.

Much of the expertise of CIM is centred on the capability of software development and multi-axes NC programing. Computing is carried out through time sharing services to McMaster University's CDC 6400. Additionally, part programing may be carried out on the Encode and Olivetti systems in-house or through time sharing to MDSI or General Electric.

With the installation of the CALMA-DDM system, CIM has one of the most complete Computer Integrated Manufacturing capabilities in Canada. The Design Drafting and Manufacturing (DDM) software together with the Numerical Control (NC) and finite element modelling (FEM) packages provide CIM with an outstanding capability in the CAD/CAM field.

Centre de Recherche Industrielle du Québec

333, rue Franquet
Sainte-Foy (Québec) Canada
GIV 4C7

Telephone: (418) 659-1550

Telex: 051-31569

Chief Executive Officer: Guy Bertrand, President and General Manager

Activities: Design and development of industrial and consumer products; R&D projects concerning: manufacturing processes and equipment, materials handling equipment, material transformation processes, and

industrial chemical processes. Product, equipment and process evaluation and testing; production engineering services; technical information services; technical assistance in the purchase or sale of technology.

Use of CAD techniques in R&D projects; operation of NC machines and robots for development purposes; design, development and demonstration of dedicated automated equipment; design and development of automated inspection equipment; industrial microprocessor applications; electro-optical sensor development; technical assistance to industries in CAD/CAM techniques.

Communications Research Centre

Department of Communications
Directorate of Information Technology Research and Development
P.O. Box 11490, Station "H"
Highway 17B
Ottawa, Ontario, Canada
K2H 8S2

Telephone: (613) 596-9221

Telex: 053-1413

Chief Executive Officer: W. Sawchuk, Director

Contact: A. Tenne-Sens, Technical Adviser

Activities: Conducts research into information technology as related to videotex and teletext systems, interactive computer graphics systems, applications of new communications systems and digital television.

Department of Public Works

Computer-Aided Design Development Division
Technological Research and Development
Sir Charles Tupper Building, Confederation Heights
Ottawa, Ontario, Canada
K1A 0M2

Telephone: (613) 998-9513

Contact: Robert.Bycraft, Chief

Activities: Development of interactive computer graphics and engineering analysis software using a stand alone intelligent graphics terminal concept. Application software is aimed primarily at architecture and engineering related to building design but the interactive drafting capability is readily adapted to any drafting application.

Manitoba Research Council

Industrial Technology Centre
1329 Niakwa Road
Winnipeg, Manitoba, Canada
R2J 3T4

Telephone: (204) 255-9625

Chief Executive Officer: D.J. Stec, Industrial Engineering Specialist

Contact: W.V. Bowerman, Director

Activities: Working with the Department of Industry, Trade and Commerce, distributes 60 copies of the CAD/CAM newsletter to interested companies; establishes training seminars in these technologies.

National Research Council

Division of Electrical Engineering — Model Shop
Building M-50
Montreal Road
Ottawa, Ontario, Canada
K1A 0R8

Telephone: (613) 993-2196

Contact: D.W. Johnston, Head, Model Shops

Activities: Implementation and operation of a CNC milling machine, using a microprocessor, graphic terminal and time shared IBM 370 terminal. This extension to the current machine controller expands on the Research and Development capabilities through the use of graphic aids and APT programing. An interaction with small companies to assist them in deciding on CNC requirements is offered plus assistance in programing and machining methods.

National Research Council

Division of Mechanical Engineering
Analysis Laboratory
Building M-2
Montreal Road Laboratories
Ottawa, Ontario, Canada
K1A 0R6

Telephone: (613) 993-2834

Contact: P.A. Hamill, Laboratory Head

Activities: Application of computer modelling and simulation technology to engineering system design and plant operations/scheduling; development of simulation facility and methodology for continuous systems.

Expertise in computer modelling and simulation, collaboration on application projects, hybrid computer facility and programing expertise.

National Research Council

Division of Mechanical Engineering
Control Systems and Human Engineering Laboratory
Building M-3
Montreal Road
Ottawa, Ontario, Canada
K1A 0R6

Telephone: (613) 993-9208

Contact: Dr. J.A. Tanner, Head

Activities: Use PDP 1145 and PDP 1160 and peripherals, including graphics displays for developing manufacturing operations scheduling techniques; interactive models for plant and production scheduling, materials handling systems and energy consumption studies; interested in working with outside consultants to share NRC expertise in this field.

McGill University

Office of Industrial Research
408 Dawson Hall
853, rue Sherbrooke ouest
Montréal (Québec) Canada
H3A 2T6

Telephone: (514) 392-4963

Telex: 05-268510

Contact: Adolph Monsaroff, Director

Activities: Simulation and control of industrial processes; computer-aided design and analysis for three-dimensional electromagnetic field problems; computer-aided analysis and design of electronic circuits; image processing and pattern recognition.

Provides support for departments of electrical, mechanical and chemical engineering; research projects for industry; consulting in areas of competence.

Ontario Research Foundation

Sheridan Park Research Community
Mississauga, Ontario, Canada
L5K 1B3

Telephone: (416) 822-4111

Telex: 06-982311

Chief Executive Officer: W.R. Stadelman, President

Contact: S. Barclay, Assistant Director of Engineering

Saskatchewan Research Council

30 Campus Drive
Saskatoon, Saskatchewan, Canada
S7N 0X1

Telephone: (306) 664-5400

Telex: 074-2484

Chief Executive Officer: Dr. T.P. Pepper, Executive Director

Contact: Gordon Pierce, Manager, Product Development

Activities: Four years experience in advanced finite element analysis to farm machinery components, logging and mining equipment, and production equipment; using computer graphics in machine design; computer-aided analysis of test and experimental data.

Advanced finite element analysis (static, dynamic, nonlinear); computer-aided machine design; industrial engineering assistance related to CAD/CAM installations.

Systems Analysis, Control and Design Activity (SACDA)

University of Western Ontario
Faculty of Engineering Science
London, Ontario, Canada
N6A 5B9

Telephone: (519) 679-6570

Contact: C.F. Shewchuk, Director

Activities: SACDA is a small group of professionals specializing full-time in supplying software and consulting expertise to process and design engineers for the process industries on varied types of projects, such as physical properties subroutines; distillation systems process heat and mass balance; energy systems. The projects may involve designing new processes, problem-solving and/or improving process efficiency.

SACDA offers licences and computer bureau access to all its software.

University of Waterloo

Office of Research Administration
incorporating Waterloo Research Institute
Waterloo, Ontario, Canada
N2L 3G1

Telephone: (519) 885-1211

Contact: E.L. Holmes, Director of Research Administration

Activities: Work is in process on a variety of research projects involving CAD/CAM, such as the development of low-cost computer-aided design systems; automatic selection of optimum cutting parameters; computer controlled sewing systems; multiple machine tool control by minicomputer; master slave computer numerical control system; manufacture of bevel gears by CAM techniques; computer-aided design: lofting of 3D surfaces; and a digital computer program for optimizing current conditions for milling machines and lathes.

EDUCATIONAL INSTITUTIONS

Acadia University

School of Engineering
Wolfville, Nova Scotia, Canada
B0P 1X0

Telephone: (902) 542-9121

Contact: G. Bustin, Lecturer

Activities: Computer graphics; software development and testing.

British Columbia Institute of Technology

Mathematic (Core Division) and Mechanical, Building (Engineering Division)
3700 Willingdon Avenue
Burnaby, British Columbia, Canada
V5G 3H2

Telephone: (604) 434-5734

Contact: Peter M. Hobbins, Senior Instructor, Mathematics Department

Activities: Exposure of students to CAD/CAM hardware, software and concepts. Programing algorithms and the mathematics of transformations and analytic geometry are stressed in Math courses. Some software which runs on the mathematics resource HP9825A (with four colour plotter/digitizer) and Apple micro-computer systems which illustrate some aspects of CAD that have been developed.

Carleton University

Electronics Department
Ottawa, Ontario, Canada
K1S 5B6

Telephone: (613) 231-2727

Contact: John Knight, Associate Professor

Activities: Computer-aided design of digital circuits, optimization, and testing; technical advice and consulting. Extensive work has been done on modelling for CAD programs. An interactive version of "SPICE" was implemented here. The Electronics Department has an IC Layout program which directly feeds a pattern generator. Mask making facilities are available.

Centennial College of Applied Arts and Technology

P.O. Box 631, Station A
Scarborough, Ontario, Canada
M1K 5E9

Ashtonbee Campus

Telephone: (416) 752-4444

Contacts: Norman G. Eley, Dean
Transportation and Industrial Power Technology Division
R. Pavlovich, Co-ordinator
Fluid Power and Robotics Programs

Activities: TRAINING IN ROBOTICS

1. Fluid Power and Robotics Technician — two-year course
   Fluid Power and Robotics Technologist — three-year course

   These two courses are post-secondary day courses. They deal with basic pneumatic, hydraulic mechanical electrical systems for industrial automation and robotics. The program has been presented for 17 years under the title of "Fluid Power Technology": however, graduates are almost all moving into the industrial production and systems field.

2. Industrial Robotics Technician — 39-40 weeks

   Planned for September 1982, this program is directed towards preparing a graduate to handle the problems on the production line relating to robotics and automation systems. Emphasis is placed on electronic and electrical control systems, as well as the usual mechanical maintenance requirements.

Both programs have significant training hours devoted to CAM systems, micro-processors and electronic controls.

The Fluid Power-Robotics group has the most extensive laboratory facilities in Canada and plans include the installation of a variety of industrial robots, including pick and place, point to point and continuous path operating modes.

Progress Campus

Telephone: (416) 439-7180

Contacts: Mrs. M. Kende,
Dean of Engineering Technology
William Henderson,
Chairman, Mechanical Civil Technology

Activities: CAD/CAM TRAINING
Although there are no specific courses of study directed solely to CAD/CAM, several courses incorporate aspects of CAD/CAM.

Computer-aided design, use of micro-processors and other design aids and concepts form a part of technology courses in civil, mechanical architectural, electrical, electronics and chemical technology areas. Plans for inclusion of "hands-on" training are now under consideration.

Computer-aided manufacturing techniques and concepts are included in the programs being given in mould making and metal machining. These inputs are limited at present, but future plans will place emphasis on CAM methodology.

Concordia University

Electrical Engineering
1455, boulevard de Maisonneuve ouest
Montréal (Québec) Canada
H3G 1M8

Telephone: (514) 879-4482

Contact: A. Antoniou, Chairman and Professor

Activities: Computer-aided design of Surface Acoustic Wave resonators, filters and couplers. These devices are used in signal processing and cover the 20 MHz-500 MHz frequency range. Digital filters.

Design support for microwave couplers, filters and antenna feed systems, Surface Acoustic Wave multistrip couplers, resonators and narrow baud high Q filters. Design and analysis of digital filters.

Concordia University

Mechanical Engineering
1455, boulevard de Maisonneuve ouest, H 929
Montréal (Québec) Canada
H3G 1M8

Telephone: (514) 879-5985

Contact: Dr. S. Sankar, Associate Professor

Activities: CAD and interactive graphics of mechanical systems such as gear boxes, vehicle suspensions, seat design, active vibration control, design of isolators and dampers.

Can undertake any projects in the area of mechanical systems to provide computer-aided design package for use in industry.

Concordia University

Fluid Control Centre
Mechanical Engineering Department
1455, boulevard de Maisonneuve ouest, pièce H833
Montréal (Québec) Canada
H3G 1M8

Telephone: (514) 879-4552

Contact: Dr. Richard M.H. Cheng, Professor in Engineering

Activities: The Fluid Control Centre is heavily involved in computer-aided design of mechanical and control systems as well as in developing systems controlled by mini and micro-computers.

Some of the activities are computer-aided design and simulation of sequential logic circuits for process control, a novel concept of micro-processor (uP) based programable sequential controller, a uP-controlled template following machine table for point-to-point operation, a polar-co-ordinate light-duty numerical-control machine, a minicomputer-controlled wood-cutting system, a computerized setup for evaluating the position of c.g. and angular orientation of flat objects (used in automatic assembly and manufacturing), etc.

Also consultation, joint adventures (in research and machine development).

Durham College of Applied Arts and Technology

P.O. Box 385
Oshawa, Ontario, Canada
L1H 7L7

Telephone: (416) 576-0210

Contact: Jack Davidson, Director, of Technology

Activities: Durham College announced the formation of its CAD/CAM Centre in the fall of 1981, and the plans for its use, beginning early in 1982.

CAD/CAM courses will be offered in mechanical design, numerical control design and printed circuit design. Later programs will also relate to civil engineering. Ten groups of courses will be available through Training in Industry and Business (TIBI).

Durham College will also be offering training opportunities and advisory services to companies interested in CAD/CAM.

École Polytechnique de Montréal

Civil Engineering — Structures Section
Campus de l'Université de Montréal
Case Postale 6079, Succursale "A"
Montréal (Québec) Canada
H3C 3A7

Telephone: (514) 344-4781

Contact: Dr. René Tinawi, Associate Professor

Activities: Software development for CAD of structural steel buildings. Software development for CAD graphics systems.

Research contracts for development of software and/or analysis of structures.

École Polytechnique de Montréal

Electrical Engineering —
Computer Aided Design and Hybrid Computation Laboratory
Campus de l'Université de Montréal
Case Postale 6079, Succursale "A"
Montréal (Québec) Canada
H3C 3A7

Telephone: (514) 344-4884

Contact: Michael P. Polis, Associate Professor

Activities: The laboratory is involved in developing interactive computer-aided analysis and design for software specialized applications.

The laboratory makes available interactive graphics terminals (a Tektronix 4010, a D.E.C. VT-11 and an A.E.D. 512) connected to a PDP11/60 mini-computer.

A COMTAL image processing system is also available. Computer time and engineering support are available.

Fanshawe College of Applied Arts and Technology

Mechanical Engineering Technology Division
P.O. Box 4005, Terminal "C"
London, Ontario, Canada
N5W 5H1

Telephone: (519) 452-4415

Contact: Fred Brill, Chairman

Activities: Manufacturing engineering technology and technician co-operative training programs, and general machinist, tool and die maker apprentice training programs; numerical control programing, including both manual and computer assist (COMPACT II). Also has other CAM areas under development.

George Brown College of Applied Arts and Technology

Mechanical Technology Department
P.O. Box 1015, Station "B"
Toronto, Ontario, Canada
M5T 2T9

Telephone: (416) 967-1212 ext. 452

Contact: Jeff Collins, Teaching Master
George Danac, Chairman

Activities: Daytime numerical control for mechanical technology students; hands-on experience program; debugging using plotters. Part-time, as above, but more theoretical in programing. Multi Axis APT programing, plotting and debugging.

Humber College of Applied Arts and Technology

Technology Division
205 Humber College Boulevard
Rexdale, Ontario, Canada
M9W 5L7

Telephone: (416) 675-3111 ext. 473

Contact: Bob Higgins, Dean

Activities: Teaches CNC programing and computer-assisted CNC programing and will custom make certain parts on CNC lathes and CNC machining centres. The college will shortly be moving into CAD and CAM systems; provides external training to companies in NC programing of various types of CNC machines including computer-assisted programing. As well, the college will provide consulting services for difficult programing problems, particularly in the field of CAM design and programing.

McGill University

Mechanical Engineering Department
817, rue Sherbrooke ouest
Montréal (Québec) Canada
H3A 2K6

Telephone: (514) 392-4549

Contact: Roy Hoffman, Associate Professor

Activities: Teaching of courses and research projects in computer-aided design, computer graphics, computer-aided programing of numerically-controlled machine tools; numerical control programing using the APT language and SSX8 sculptured surfaces processor. Writing of postprocessors for NC machines; prototype machining of parts via an NC lathes or 3-axis NC machining centre, plotting of tool motions to verify NC types; development of specialized programs for

computer-aided design, computer-aided manufacture, computer graphics, etc., to customer specifications.

Niagara College of Applied Arts and Technology

Mechanical Technology
P.O. Box 1005
Welland, Ontario, Canada
LOS 1E0

Telephone: (416) 735-2211

Contact: A.E. Mills, Instructor

Activities: Offer day and evening courses in basic numerical control. Low-level computer languages only used. NC machines are 2, 2½ and 3 axes respectively with point-to-point open loop controls; have available three NC mills, with two mini-computers for NC tape generation.

Northern College of Applied Arts and Technology

P.O. Box 2002
South Porcupine, Ontario, Canada
P0N 1H0

Telephone: (705) 235-3211

Telex: 067-815-41

Contact: D.H. van Vianen, Chairman

Activities: Computer science, electronic technology and mechanical/welding technology programs include topics involving CAD/CAM. On an occasional basis, for particular projects, this college offers consulting services, especially in the area of microprocessor use.

Queen's University

Department of Chemical Engineering
Dupuis Hall
Kingston, Ontario, Canada
K7L 3N6

Telephone: (613) 547-6612

Contact: Dr. Peter L. Douglas, Assistant Professor

Activities: Introduction of computer-aided design techniques into the chemical engineering curriculum; hands-on experience with CAD packages for the solution of typical material and energy balance problems encountered in chemical engineering; demonstration of CAD techniques for the solution of industrial design problems.

Queen's University

Department of Civil Engineering
Kingston, Ontario, Canada
K7L 3N6

Telephone: (613) 547-6184

Contact: H.M. Edwards, Head
Dr. D. Turcke, Associate Professor

Activities: Currently developing computer-aided design procedures employing the finite element method of analysis (i.e., advanced computer graphics techniques); technical support from a research perspective.

Queen's University

Computing and Information Science
Kingston, Ontario, Canada
K7L 3N6

Telephone: (613) 547-2711

Contact: M.A. Jenkins, Professor

Activities: This department is involved in software designed for interactive environments. Two major projects are in the developmental stage — one on a generalized model for building interactive systems (contact: D.T. Barnard) and one an interactive programing system for prototyping CAD/CAM systems (contact: M.S. Jenkins). Software is expected to be available for release in 1982.

Queen's University

Department of Electrical Engineering
Kingston, Ontario, Canada
K7L 3N6

Telephone: (613) 547-6935

Contact: S.R. Penstone, Professor

Activities: Computer-aided layout of large-scale integrated circuits; computer-aided design of electrical machines; computer-aided design of digital and anologue filters.

Queen's University

Engineering Drawing Department
Room 212, Jackson Hall
Kingston, Ontario, Canada
K7L 3N6

Telephone: (613) 547-3073

Contact: C. Mulvenna, Dr.
C.W. Pidgeon

Activities: Machine design and simulation; computer graphics; mathematical modelling, interactive design, simulation; digitizing and processing of three-dimensional data to produce pictorials in perspective, axonometric, oblique, stereoscopic, orthographic or animated movie sequences.

Queen's University

Mining Engineering Department
Goodwin Hall
Kingston, Ontario, Canada
K7L 3N6

Telephone: (613) 547-3158

Telex: 066 3244

Contact: Dr. P.N. Calder, Head

Activities: Optimum design of open pit mines; computer simulation of shovel truck haulage systems; computer graphic mine planning. Department offers contract research services to industry.

Red River Community College

Technology Division
Mechanical, Civil, and Electronics Departments
2055 Notre Dame Avenue
Winnipeg, Manitoba, Canada
R3H 0J9

Telephone: (204) 632-2291

Contact: Walter M. Gray, Chairman

Activities: Mechanical technology-Pert/CPM/project control/inventory computer programs; numerical controlled milling machine (Moog) and design computer programs. Civil technology-surveying plotting applications (limited capability); Pert/CPM/project control programs; water network program; COGO package. Electronics technology-introduction to graphics; analog and digital circuit design and simulation programs; filter design programs; microprocessor control systems; computer control system. Future plans include: More graphics display; enhanced plotting systems; digitizing systems for design and layout; standardized SIGGRAPH software; more current simulation and design programs; laboratory computer system(s).

This college provides two-year technology training programs.

Royal Military College

Mechanical Engineering Department
Kingston, Ontario, Canada
K7L 2W3

Telephone: (613) 545-7356

Contact: Dr. F.J. Ferguson, Associate Professor

Activities: Non-circular and circular gear design using wire EDM.

Ryerson Polytechnical Institute

Mechanical Engineering Department
50 Gould Street
Toronto, Ontario, Canada
M5B 1E8

Telephone: (416) 595-5000

Contacts: Peter J. Williams, Professor
R.A.A. Oatridge, Professor

Activities: Computer-aided programing to produce components using numerical control machines; computer-aided programing in industrial engineering areas of work study, facilities planning, operations research, production control and inventory control.

Teaching manual and computer language (APT) for control of the above.

Computer aid work study.

Sir Sandford Fleming College

Technical Division
Brealey Campus
Peterborough, Ontario, Canada
K9J 7B1

Telephone: (705) 743-6347

Contact: Peter Brockenshire, Co-ordinator Mechanical Design
E.R. Jones, Chairman, Technical Division

Activities: Feasibility study under way for inclusion of CAD course in the mechanical design program. Programable control is taught in the technology programs and electrical technician programs (computer based control system for manufacturing equipment); planning to provide basic instruction with laboratory backup in CAD.

University of British Columbia

Mechanical Engineering Department
Faculty of Applied Science
2075 Wesbrook Mall
Vancouver, British Columbia, Canada
V6T 1W5

Telephone: (604) 228-2781

Contact: J.P. Duncan, Professor

Activities: Occasional advice to industry on very complex surface machining. Own trademark POLYHEDRAL NC © in Canada — CAD/CAM system developed at UBC 1968-1981 software publicly available; limited availability of resources; consulting advice on setting-up CAD/CAM; experienced in instructing students on elements of computer-aided manufacture (202 students 1981).

University of Calgary

Department of Computer Science
2500 University Drive Northwest
Calgary, Alberta, Canada
T2N 1N4

Telephone: (403) 284-6315

Contact: Professor R.L. Jenkins

Activities: Currently implementing a multi-user, interactive printed circuit board design/layout system on a VAX 11-780 running UNIX.

University of Calgary

Mechanical Engineering Department
2500 University Drive Northwest
Calgary, Alberta, Canada
T2N 3X2

Telephone: (403) 284-5732

Telex: 038-21545

Contact: E.W. Johnson, Associate Dean, Engineering

Activities: Computer-aided production of tapes for numerically-controlled machines for manufacture of non-analytical surfaces, such as artificial limbs; advice, consultation, and training in programing for numerically-controlled machines.

Department will provide initial advice and help with training of personnel for outside groups.

Senior undergraduate course in CAD being mounted in winter 1982; research on CAM of protheses; finite element analysis of hip prothesis; some N/C machining programing being taught at undergraduate level; future capital purchases of N/C milling machine and computer graphics facilities close at hand.

University of Guelph

Department of Computing and Information Science
Gordon Street
Guelph, Ontario, Canada
N1G 2W1

Telephone: (519) 824-4120

Contact: Dr. James G. Linders, Chairman

Activities: The Department of Computing and Information Science is actively involved with computer mapping applications for government. This area involves both extensive computer graphics and design automation data bases.

Services to be provided include data base design and implementation for design automation; software development; system consulting, etc. Various equipment including digitizers, flatbed plotter and colour graphics terminal are available for experimentation and development work.

University of Montreal

Department of Computer Science and Research
C.P. 6128, Succursale "A"
Montréal (Québec) Canada
H3C 3J7

Telephone: (514) 343-6780

Contact: Professor W.W. Armstrong

Activities: Research and consulting in computer graphics and image processing; manipulator dynamics; microcomputer applications; development of software and hardware in computer graphics; image processing; communication protocols; videotex systems, etc.

University of New Brunswick

Department of Mechanical Engineering
Manufacturing and Production Engineering Program
P.O. Box 4400, Head Hall
Fredericton, New Brunswick, Canada
E3B 5A3

Telephone: (506) 453-4513

Telex: 014-46202

Contact: Dr. David J. Bonham, Associate Professor, Chairman of Department

Activities: Computer support facilities; computer numerical control for TOS Kirum mill; development of adaptive control systems and graphic modelling design; consulting; APT programing; integration of CAD with CAM, the use of geometric models for display (interactive graphics), engineering analysis (finite elements, numerical optimization, etc.), computer-assisted process planning and numerical control part programing (sculptured surfaces, adaptive control). This work utilizes a common data base and is implemented on a distributed computer network for information transfer and data processing.

The Department offers to industry the following services: (1) APT systems support; integration of users post processors, etc.; (2) sculptured surface system support; (3) part programing assistance; (4) process planning systems; (5) hardware selection and evaluation assistance; (7) two courses for industry, (a) introduction to numerical control and computer-assisted part programing and (b) advanced numerical control and computer-assisted part programing.

University of Québec at Three Rivers

Department of Engineering, Electrical Section
Research Group (Power Electronics)
C.P. 500
Trois-Rivières (Québec) Canada
G9A 5H7

Telephone: (819) 376-5681

Contact: Dr. V. Rajagopalan, Professor

Activities: Computer-aided design program for the analysis and design of power electronic converter systems containing semiconductor switches such as thyristors, diodes. This program named ATOSEC I (MODIFIED) is a program for transient analysis of power electronic networks comprising R,L,C elements, diodes and thyristors. Networks may consist of a maximum of 30 thyristors, 30 diodes, 40 resistors, 40 inductances, 40 capacitors, 120 branches up to 60 vertices and 60 state variables, 40 capacitors, 120 branches up to 60 vertices and 60 state variables. Final results may be plotted on a CALCOMP Plotter, TEKTRONIX Plotter model 4662, graphic terminal TEKTRONIX model 4013. Program runs in 40 K octal minimum. Data will be supplied for typical power electronic converters; additional program for harmonic analysis. Program will be supplied on magnetic tape; at a cost of $500 for educational institutions and at a cost of $3,000 for industries.

Program suitable for CDC CYBER system along with copies of users' manual with solved problems and data (both in English and French) will be supplied.

University of Sherbrooke

Department of Mechanical Engineering
2500, boulevard University
Sherbrooke (Québec) Canada
J1K 2R1

Telephone: (819) 565-4490

Contact: Professor Y. Van Hoenacker
Professor M. Brezina

Activities: Teaching and/or research in the field of NC machine tools, manual and computer-aided (family APT) programing of NC machine tools, computer graphics, computer-aided design, industrial robots, prototype machining of small parts on a 3-axis CNC mill, contract research and consulting in the above-mentioned areas.

University of Waterloo

Electrical Engineering
Waterloo, Ontario, Canada
N2L 3G1

Telephone: (519) 885-1211

Contact: Warren Little, Associate Professor

Activities: Micro-computers for machine control; software for pattern input and manipulation; real-time software and systems; CAD/CAM consulting; prototype demonstrations.

University of Western Ontario

Faculty of Engineering Science
London, Ontario, Canada
N6A 5B9

Telephone: (519) 679-3894

Contact: J.A. MacDonald, Associate Professor
A.G. Davenport, Director, B.L.W.T
D.J. Harman, Associate Professor

Activities: An interdisciplinary team utilizes computer-aided design in facilities layouts; materials handling; systems optimization; automatic control systems utilizing micro-processors and mini-computers; finite elements for vibration and fluid flow analysis; wind energy.

The Boundary Layer Wind Tunnel Laboratory, under the direction of Dr. A.G. Davenport, is involved in research and computer-aided design activities which include: on-line data acquisition of various wind induced effects on buildings and structures; design of specific structures for wind and earthquake effects; offshore problems.

Government of Canada
Gouvernement du Canada

Industry, Trade and Commerce
Industrie et Commerce

Canada