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1986

CAD/CAM

**A DIRECTORY
OF COMPANIES AND ORGANIZATIONS
PROVIDING CAD/CAM PRODUCTS AND
SERVICES IN CANADA**



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INDUSTRIES



A. F. MUNDY ASSOCIATES LTD

66 Racine Drive
Rexdale, Ontario
M9W 2Z7

Telephone: (416) 745-6976
Telex: 06-989461

Chief Executive Officer: A. F. Mundy, P.Eng.,
President

Senior Engineering Executive: R. W. Simpson

Branch Offices: Vancouver, Edmonton, Grimsby
(Ont.), Montréal

Size: 10 employees; annual sales between
\$2 million and \$20 million

Activities: Mundy supplies Hitachi process
robots, Thermwood paint sprays,
electric and cartesian robots, Advanced
Robotics Corp arc welding equipment,
and CAD/CAM-directed tube-bending
robotics systems.

A.I.M. ELECTRONICS INC

108 - 376 Churchill Avenue
Ottawa, Ontario
K1Z 5C3

Telephone: (613) 722-8286

Chief Executive Officer: Paul Graziadei,
President

Senior Marketing Executive: Steven Gurr,
Sales Manager

Branch Offices: 15 - 855 Alness Street
Downsview, Ontario
M3J 2X3

5795 Donahue Street
Saint-Laurent, Quebec
H4S 1C4

Size: 10 employees; annual sales between
\$2 million and \$20 million

Activities: A.I.M. sells graphics software,
colour PCB CAD systems and digitizers
produced by Accupoint, Wayne Kerr,
Numonics and Soltec, and supplies
various flat-bed and digital pen
plotters for business and professional
graphics. It also has capabilities in
computer-aided repair of printed
circuit boards.

ALLEN CRAWFORD ASSOCIATES LTD

5835 Coopers Avenue
Mississauga, Ontario
L4Z 1Y2

Telephone: (416) 890-2010

Chief Executive Officer: R. A. Dunne,
President

Senior Marketing Executive: A. S. Martin,
General Manager

Senior Engineering Executive: Brad Watson

Branch Offices: Vancouver, Calgary, Ottawa,
Montréal, Halifax

Size: 120 employees; annual sales of more
than \$20 million

Activities: Crawford sells graphics displays,
microprocessor system testers, PROM
programmers for testing microprocessor
systems, and automatic testing
equipment such as digital and hybrid
testers. The company also sells I/O
computer systems such as data
acquisition, 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.

APOLLO COMPUTER (CANADA) LTD

130 - 1530 Markham Road
Scarborough, Ontario
M1B 3G4

Telephone: (416) 297-0700
TWX: 297-1020 (Fax)

Chief Executive Officer: Colin J. Wyatt,
General Manager

Branch Offices: Suite 405
777 - 8th Avenue S.W.
Calgary, Alberta
T2P 3R5

Suite 103
302 Moodie Drive
Nepean, Ontario
K2H 9C4

Size: 19 employees; annual sales between
\$2 million and \$20 million

Activities: Apollo, a subsidiary of Apollo
Computer Inc, Chelmsford, Maine,
manufactures integrated engineering
workstations for use with leading
third-party application solutions. It
also supplies computer hardware and
operating systems for third-party CAM
application software. It provides
facilities for customized application,
design and analysis. Apollo has
capability in the area of artificial
intelligence.

APPLICON CANADA

406 - 6711 Mississauga Road
Mississauga, Ontario
L5N 2W3

Telephone: (416) 821-7774

Chief Executive Officer: J. D. Nolan, General
Manager

Branch Offices: Toronto, Montréal

Size: 18 employees; annual sales between
\$2 million and \$20 million

Activities: Applicon, a subsidiary of
Schlumberger Canada Limited, Calgary,
Alberta, is a CAD/CAM consultant and
markets related products and services.
It supplies the BRAVO integrated
CAD/CAM system.

ARTHUR D. LITTLE OF CANADA LTD

67 Yonge Street, Suite 200
Toronto, Ontario
M5E 1J8

Telephone: (416) 361-1051

Chief Executive Officer: Paul C. White,
President

Size: 12 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. Its IMPACT services
include consulting, research letters
and reports. Many of its research
reports pertain to the CAD/CAM robotics
field, such as The Growth in U.S.
Industrial Robotics.

In addition to local resources, the
Canadian company may draw on the
resources of the parent company and its
2600 employees around the world.

ASEA INC

10300 Henri Bourassa Boulevard West
Saint-Laurent, Quebec
H4S 1N6

Telephone: (514) 332-5350
Telex: 05-824751

Chief Executive Officer: A. C. de Liry

Branch Offices: Vancouver, Calgary,
Saskatoon, Winnipeg, Toronto

Branch Plants: Toronto, Varennes (Que.)

Size: 650 employees; annual sales of more
than \$20 million

Activities: Part of the Sweden-based Asea AB group, Asea Inc, is a leader in the field of industrial robotics, with applications in automotive parts and metalworking. Specific services include learning and maintenance training centres for customers, and organized field service facilities. Robot applications include arc, spot and stud welding and gluing; automatic assembly operations; handling, such as pick-and-place; castings cleaning; deburring and polishing; measuring; inspection; and marking. Asea supplies all-electric process robots, pneumatically driven robots, and robot vision systems.

ATLAS ELECTRONICS LTD

50 Wingold Avenue
Toronto, Ontario
M6B 1P7

Telephone: (416) 789-7761

Telex: 069-69538

Chief Executive Officer: Joseph Bass,
President

Senior Marketing Executive: Alan Bass,
Marketing Director

Branch Offices: Vancouver, Calgary, Winnipeg,
Ottawa, Montréal

Size: 110 employees; annual sales of more
than \$20 million

Activities: Atlas supplies CAD/CAM devices and systems, under its own name and as a representative for Electro Corp and Preh Electronics. Atlas also supplies the keyboards and graphic tablets integral to CAD systems, as well as proximity devices and magnetic sensors. End uses include missing-part detection, the counting of steel rod output, data entry, graphic generation and signal conditioning.

ATOMIC ENERGY OF CANADA LTD (AECL)

275 Slater Street
Ottawa, Ontario
K1A 1E5

Telephone: (613) 237-3270

Telex: 053-3126

Senior Business Development Officer:
D. R. Kerluke

Size: 6857 employees; annual sales of more
than \$20 million

Activities: AECL is a Crown corporation and major CAD specialist. It provides analysis of shell and tube heat exchanger design and performance to subscriber companies who are active in heat transfer and fluid flow service. AECL also performs thermal, hydraulic analyses of nuclear steam generators which are useful in selecting replacement steam generators and in making improvements to existing units. AECL is instrumental in the design of multivariable control systems for teaching and research applications and for advanced control systems in aerospace products.

ATS AUTOMATION TOOLING SYSTEMS INC

101 Trillium Drive
Kitchener, Ontario
N2E 1W8

Telephone: (519) 893-7541
Telex: 06-955193

Chief Executive Officer: Klaus Woerner

Senior Marketing Executive: Roger Awad

Branch Office: 175 Old Half Day Road
Lincolnshire, Illinois
60069 U.S.A.

Size: 70 employees; annual sales between
\$2 million and \$20 million

Activities: ATS designs and installs flexible manufacturing systems for industry. Its areas of expertise include fully integrated robotic systems, automated assembly machines, flexible palletized conveyor assembly systems, pattern and shape recognition, soldering machinery and others. As a distributor of robotic systems integrators, ATS represents IBM, Panasonic, Adept, Transman and Intelledex. It is the exclusive Canadian distributor of robots for Seiko U.S.A. Inc. Ancillary activities include research and development and CAD/CAM consultation.

AUTO-TROL TECHNOLOGY LTD

1144 - 29th Avenue N.E.
Calgary, Alberta
T2E 7P1

Telephone: (403) 250-1232

Chief Executive Officer: F. L. Meyer,
President

Branch Offices: Vancouver, Edmonton, Toronto,
London (Ont.), Montréal

Size: 50 employees; annual sales between
\$2 million and \$20 million

Activities: Auto-Trol, a subsidiary of Auto-Trol Technology Corporation of Denver, Colorado, supplies and develops CAD/CAM equipment designed to increase productivity in a range of industries: general manufacturing, petrochemical engineering and construction, mapping, and architectural and space planning. Its products include graphics systems for technical illustrators and publishers, numerical control software, advanced graphics workstations, RAP-PID for process and instrument diagrams and STEEL-3D for structural frame design.

AVEC CADMUS

145 The West Mall
Etobicoke, Ontario
M9C 1C2

Telephone: (416) 621-7043

Chief Executive Officer: John Leng,
President

Senior Marketing Executive: Richard Earle,
Vice-President

Branch Office: 5901 Trans-Canada Highway
Pointe-Claire, Quebec
H9R 1B7

Size: eight employees; annual sales between
\$250 000 and \$2 million

Activities: Avec Cadmus, a subsidiary of Cadmus Computer Systems Inc of Lowell, Massachusetts, supplies the Design Graphix system, combining drafting, design, and engineering processes in one operation for use in mechanical, structural, and electrical engineering; architectural and roadway design; mechanical flow sheets; piping drawings; and electronic schematics. It developed and markets the CADMUS

9000 distributed system, which provides a stand-alone workstation incorporating a 32-bit virtual memory processor, the UNIX System V O/S, 1280 x 1024 resolution and multistation configurations with Ethernet. It supplies applications software in a variety of areas, including graphics CAD/CAE/CAM, business tools, and programming language, and represents Design Engineering Systems, Cericor, and Neo-Visuals Inc.

BARER ENGINEERING & MACHINERY COMPANY LTD

1365 Bassin Street
Montréal, Quebec
H3C 1W3

Telephone: (514) 937-3911

Chief Executive Officer: A. Barer, President

Senior Marketing Executive: D. Barer,
Vice-President

Branch Office: 41 Horner Avenue
Toronto, Ontario
M8Z 4X4

Size: 25 employees; annual sales between
\$2 million and \$20 million

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. Barer also provides consulting services.

BAYER NC TECHNOLOGIES LTD

1339 Matheson Boulevard
Mississauga, Ontario
L4W 1R1

Telephone: (416) 624-4001

Chief Executive Officer: Peter Bayer,
President

Senior Marketing Officer: Paul Bayer,
Vice-President

Senior Engineering Executive: David McGuire

Size: eight employees; annual sales between
\$250 000 and \$2 million

Activities: Bayer is a representative for the products of several firms supplying a range of NC/CNC parts programming systems. For example, Numeridex NICAM I, designed for complete turnkey systems, is compatible with standard DEC processors and operating systems. NICAM III provides a multi-user, multifunction, interactive, colour graphics system, and both the NICAM I and NICAM III systems interact with Numeridex CAD workstations. Other products include Anvil 2D/3D systems, and Data Specialities' NC-2400 System II, a tape preparation service.

BCB ELECTRONIC SALES

12295 Highway 50
Bolton, Ontario
L0P 1A0

Telephone: (416) 857-0790

Telex: 06-969755

Chief Executive Officer: Robert Cook

Senior Marketing Executive: Heather Welner

Senior Engineering Executive: William Meyer

Branch Office: Edmonton

Size: 16 employees; annual sales between
\$250 000 and \$2 million

Activities: BCB's products include those of Kurta, General Parametrics, LogE/Dunn Cameras, Lang Systems, and Cromemco

Computer Graphics. BCB serves an entire range of computer graphics needs, supplying 35 mm cameras that interface with small to large graphics systems. In addition, it supplies multi-tasking systems and accessories, such as plotters and digitizers.

B. ELLIOTT (CANADA) LTD

476 Evans Avenue
Toronto, Ontario
M8W 2T9

Telephone: (416) 252-5252
Telex: 06-967558

Chief Executive Officer: Michael Carr,
President

Senior Marketing Executive: Michael Slater,
Executive Vice-President

Branch Office: Montréal

Branch Plant: Montréal

Size: 50 employees; annual sales between
\$2 million and \$20 million

Activities: B. Elliott designs, furnishes and installs CAM systems. As the Canadian subsidiary of B. Elliott International Ltd, it also supplies machine tools of the English parent company's manufacture, as well as NC lathes and programmable controllers. It represents the following companies in the field of computer numerical control: Matsuura, Nakamura Tome (Japan); Drop & Rein, and Behrens (West Germany); Butler (Britain); and Giddings and Lewis (U.S.A.).

BLANAROVICH ENGINEERING INC

P.O. Box 65
Don Mills, Ontario
M3C 2R6

Telephone: (416) 439-6679

Chief Executive Officer: Yuri Blanarovich,
President

Branch Office: New York City, U.S.A.

Size: 6 employees; annual sales between
\$250 000 and \$2 million

Activities: Blanarovich provides a comprehensive range of services in the design and application of flexible automation and robot systems for automated manufacturing, including modification and special outfitting of robots, programming and turnkey systems. Additional specialties include preparation of feasibility studies, computer and microprocessor control and industrial process application and measurement, radio frequency and electromagnetic interference suppression, fibre optics, and laser machining. It also has experience in mechanical systems design.

BRUNINGCAD

165 Milner Avenue
Scarborough, Ontario
M1S 4G7

Telephone: (416) 298-2700

Chief Executive Officer: R. C. Richards,
President

Senior Marketing Executive: S. J. Jefferies,
Vice-President

Branch Office: 5850 Côte de Liesse
Montréal, Quebec
H4T 1B6

Size: 20 employees; annual sales between
\$2 million and \$20 million

Activities: BruningCAD, a subsidiary of AM International Inc, supplies Easydraft2, Easy Three, and Attribase CAD software

to manufacturers, architectural firms, engineers, drafting specialists, and facilities planners. BruningCAD software integrates with various third-party CAM products.

BURROUGHS CANADA

801 York Mills Road
Toronto, Ontario
M3B 1X8

Telephone: (416) 445-4030
Telex: 06-96636

Chief Executive Officer: T. I. Csathy,
President

Branch Offices: Vancouver, Edmonton, Calgary,
Winnipeg, Kitchener, Toronto, Ottawa,
Montréal, Québec, Saint John, Halifax,
St. John's

Size: 1288 employees; annual sales of more
than \$20 million

Activities: Burroughs, a subsidiary of the
Burroughs Corporation of Detroit,
Michigan, provides geometric modelling
software for extended geometry
surfacing techniques; drafting modules
with a relational DBMS symbols library
and IGES translator; and solid
modelling systems with algorithmic
graphics, interface language and finite
element modelling. In CAM, Burroughs
supplies a three-axis/five-axis NC
lathe module using OPTI NEST and OPTI
MOLD for fiat pattern development.

CADCO GRAPHICS LTD

525 Seymour Street, Suite 109
Vancouver, British Columbia
V6B 3H9

Telephone: (604) 687-3111

Chief Executive Officer: Mary-Lou Perry,
B.Com., President

Size: five employees; annual sales between
\$50 000 and \$250 000

Activities: CADCO operates a service bureau
which is concerned with computer-aided
design in two-dimensional drafting.
Its customers are in Canada and the
United States.

CADDESIGN SERVICES

1200 Aerowood Drive
Mississauga, Ontario
L4W 2S7

Telephone: (416) 624-3842
Telex: 06-961331

Chief Executive Officer: Derek Pearce,
Vice-President

Senior Marketing Executive: Keith E. Moffat,
Vice-President

Size: five employees; annual sales between
\$50 000 and \$250 000

Activities: CADDesign provides computer-aided
drafting and custom-engineered CAD
systems. It maintains a service
bureau, which offers educational,
time-sharing, plotting, and
AutoCAD/Intergraph translation
services. Its manufacturing-sector
services now include 2½-dimensional NC
for end use in two-axis NC machining.
CADDesign represents such organizations
as Houston Instruments, Nicolet,
Kimtron, Microvitec, Mouse Systems,
Microsoft, AutoCAD and MegaCAD.

CAD-TECH LTD

R.R. 3
Kinburn, Ontario
K0A 2H0

Telephone: (613) 839-5700

Chief Executive Officer: Clifford Inwood,
President

Size: four employees; annual sales between \$250 000 and \$2 million

Activities: Cad-Tech provides CAD/CAM consulting services. Its expertise covers hybrid circuitry for telecommunications; the design of software systems to control application of components and to monitor automotive assembly lines for defect detection; and electronics assembly design for aeronautics applications. It also provides advice on specifications, procurement and validation for new CAD installations.

CAE ELECTRONICS LTD

8585 Côte de Liesse
Saint-Laurent, Quebec
H4L 4X4

Telephone: (514) 314-6780
Telex: 05-824856
TWX: 610-422-3063

Chief Executive Officer: N. B. Cavadias

Senior Marketing Executive: D. R. Tait

Senior Engineering Executive: M. Kapadia

Size: 1800 employees; annual sales of more than \$20 million

Activities: This member of the CAE group designs and manufactures flight simulators for helicopter and fixed-wing aircraft, and has introduced the hydrostatic, six-degree freedom-of-motion system, use of a general-purpose computer and CRT-based instructor's facilities. In avionics, CAE supplies magnetic anomaly detection systems used in anti-submarine warfare and in geophysical exploration. A related system includes the fully automatic compensation system, which employs a microcomputer to perform calculations and to generate required

compensation data. Other CAE activities focus on nuclear and electrical power, oil and gas, air traffic control and space projects. CAE produces power plant simulators; monitoring and control devices, such as the SCADA System; and remote control terminals.

CALCOMP-SANDERS (CANADA) INC

401 Champagne Drive
Downsview, Ontario
M3J 2C6

Telephone: (416) 635-9010
Telex: 06-219733

Chief Executive Officer: Frank Roy,
President

Senior Marketing Executive: P. D. Vasarhelyi,
National Sales Manager

Senior Engineering Executive: Mah Obal

Branch Offices: Vancouver, Calgary, Edmonton,
Regina, Toronto, Ottawa, Montréal,
Québec, Halifax

Size: 46 employees; annual sales between \$2 million and \$20 million

Activities: A subsidiary of Calcomp-Sanders of Anaheim, California, this company supplies vector and electrostatic plotters and digitizers for industry. Calcomp also provides complete turnkey CAD systems for the AEC market for architectural and building design application and facilities planning.

CALMA COMPANY

1700 - 1 Yonge Street
Toronto, Ontario
M5E 1E5

Telephone: (416) 365-6688
Telex: 06-218664

Senior Marketing Executive: Cliff Gentle,
Acting District Manager

Branch Offices: 1176 West Georgia Street
Suite 1500
Vancouver, British Columbia
V6E 4A2

6600 Trans-Canada Highway
Suite 750
Pointe-Claire, Quebec
H9R 4S2

Size: 16 employees; annual sales between
\$2 million and \$20 million

Activities: Calma supplies software for NC
tool path generation, customized
post-processors for NC machine tools,
and an interface for co-ordinating
measuring machines. Applications for
its software are MILLPRO and CMM
interface, and its design expertise
includes VAX, Apollo, and Data General
CPU-based systems, with end uses in
automotive component, plastic mold and
integrated circuit designs.

CAMMA COMPANY LIMITED

P.O. BOX 789
Cobourg, Ontario
K9A 4S3

Telephone: (416) 372-0123

Chief Executive Officer: Alan Hallworth,
President

Senior Marketing Executive: G. McEwan,
Product Manager

Senior Engineering Executive: A. Hallworth

Size: nine employees; annual sales between
\$250 000 and \$2 million

Activities: Camma supplies micro-processor
controlled X-Y-Z dispensing machines
used in the selective, conformal

coating of component leads on completed
circuit boards. Other uses include
epoxy inlay, solderpaste application,
and masking for instrumentation panels.
It is the Canadian representative for
Knight Tool Company Inc, Haverhill,
Massachusetts.

CANADA-ONTARIO CENTRE FOR ADVANCED MANUFACTURING

2795 Kew Drive
Windsor, Ontario
N8T 3B7

Telephone: (519) 974-3377

Chief Executive Officer: R. E. McGuire,
General Manager

Senior Consultants:

David E. Ainsworth, CAD/CAM Consultant
David R. Ashman, Technical Services

Activities: A subsidiary of the Ontario
Centre for Advanced Manufacturing, this
centre provides information and
assistance in CAD techniques to local
industries. It conducts seminars and
plant visits, and offers a technology
demonstration program. Technical staff
draw upon the Ontario CAD/CAM Centre in
Cambridge and the Ontario Robotics
Centre in Peterborough for specialized
information. The centre's expertise
pertains to all advanced manufacturing
related to automotive and support
industries, but specifically the tool,
die, mold building and automotive parts
fields.

CANADATA SYSTEMS LTD

238 Hood Road
Markham, Ontario
L3R 3K3

Telephone: (416) 493-9020

Chief Executive Officer: George Smith,
President

Senior Marketing Executive: Gordon James,
Vice-President

Senior Engineering Executive:
Richard Bilbija

Size: nine employees; annual sales between
\$250 000 and \$2 million

Activities: Canadata distributes Numeric
Micro, GNT Automatic, and Decitek Corp
Equipment, including Numeric flexible
programming systems to create tapes for
numerical control; GNT automatic
punches, readers, tape systems for
computer connection and NC controllers;
and Decitek storage development and
tape readers with applications in
upgrading NC controllers to CNC or
DNC.

CANADIAN ARTIFICIAL INTELLIGENCE PRODUCTS CORPORATION

106 Colonnade Road
Suite 220
Ottawa, Ontario
K2E 7P4

Telephone: (613) 727-0082

Chief Executive Officer: Peter MacKinnon,
President

Senior Marketing Executive: Peter McKnight,
Director of Marketing and Sales

Size: 18 employees; annual sales of
\$1 million

Activities: A subsidiary of Nexa
Corporation, Ottawa, this company
operates in four main areas: contract
artificial intelligence research and
development applied to expert systems,
natural language systems and
computervision; internal research and

development on AI software; consulting
in AI technical planning and systems
development; and licensing and
marketing of AI-based products for
other companies.

CANADIAN GENERAL ELECTRIC COMPANY

1420 Dupont Street
Toronto, Ontario
M6H 2B2

Telephone: (416) 530-5202

Senior Marketing Executive: D. P. Drysak,
Manager, Industrial Automation

Branch Offices: Vancouver, Calgary, Edmonton,
Montreal

Size: 14 161 employees; annual sales of more
than \$20 million

Activities: The company, a subsidiary of
General Electric Co Ltd of Fairfield,
Connecticut, is involved in all aspects
of industrial automation, providing
full turnkey solutions to Canadian
manufacturers. Systems and products
include Calma interactive graphics,
tool crib inventory control systems,
robotic workshops for hands-on
training, NC and CNC machines, motor
controls and control components, and
flexible machining systems.

CANREP MORSE INCORPORATED

4500 Dixie Road
Mississauga, Ontario
L4W 1Z6

Telephone: (416) 625-5161

Chief Executive Officer: Gary Lewis,
President

Senior Marketing Executive: Arnold R. Tunis,
Senior Vice-President

Size: more than 200 employees

Branch Sales Offices: Vancouver, Calgary, Edmonton, Hamilton, Toronto, Mississauga, Montréal, Halifax and others throughout Canada

Activities: Canrep Morse sells CNC standard equipment produced by a variety of firms such as Muzak (lathes and machining centres), Unimate (robots), Dea (co-ordinate measuring machines), Sodick (EDM machines -- wire), and Trumpf (nibbling and punching machines). The company provides system design services and maintenance services, and also makes tape preparation systems available.

CANTROLS EQUIPMENT LTD

2410 Tedlo Street
Mississauga, Ontario
L5A 3V3

Telephone: (416) 275-1571

Telex: 06-961398

Chief Executive Officer: R. J. Hall

Branch Office: London (Ont.)

Size: 20 employees; annual sales between \$250 000 and \$2 million

Activities: Cantrols supplies ITRAN machine vision inspection systems, MAXITRON data programmable controllers, and AEC robots with end uses including incinerator and conveyor controls, energy management, and parts manufacturing inspection. Typical applications of the ITRAN 8000 include automotive needs; medical tubing, clamps and syringes; wire, wire harnesses and connectors; printed circuit boards and hybrid circuit modules. MAXITRON Data PCs are modular-compatible, providing memories and scans, multiple languages, multiscan and networking.

CDE COMPUTERIZED DRAFTING & ENGINEERING INC

101 - 385 The West Mall
Etobicoke, Ontario
M9C 1E7

Telephone: (416) 626-1456

Chief Executive Officer: Ivan Copf,
President

Size: three employees; annual sales between \$50 000 and \$250 000

Activities: CDE supplies consulting services in the development of computerized drafting and engineering systems for structural steel application.

CECOM ELECTRONICS LTD

1015 Matheson Boulevard
Mississauga, Ontario
L4W 2V3

Telephone: (416) 624-3420

Telex: 06-960171

Chief Executive Officer: Cecil Son Hing

Senior Engineering Executive: Paul Risman,
National Sales Manager

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

Activities: Cecom is a representative distributor for MegaCAD Inc and Conographics Corp, U.S.A., and Centel Corp, of England. It supplies design board three-dimensional modelling software for architects, graphic and interior designers, space and urban planners, and technical illustrators. It also markets the Cono-Color Adapter Model 40, including complementary graphics hardware and software products for IBM PCs and other PCs. Its conographic systems support conography and advanced technology that expands the graphics field to include conic curves.

CGX COMPUTER GRAPHICS

200 Consumers Road
Suite 200
Willowdale, Ontario
M2J 4R4

Telephone: (416) 493-5895

Canadian Branch Manager: Phillip E. Swan

Size: five employees in Canada; annual corporate worldwide sales of more than \$35 million

Activities: A subsidiary of CGX Corporation, Acton, Massachusetts, this company supplies high-resolution graphics video display equipment, in both raster and vector formats. Vector and raster workstations are IBM 5080 compatible.

CIMTECH

400 Sydney Street
Trenton, Ontario
K8V 4R7

Telephone: (613) 394-4871

Telex: 06-62255

Chief Executive Officer: Dr Douglas Strong,
Director of Research

Size: 35 employees

Activities: Cimtech, a subsidiary of Bata Industries Ltd, Toronto, manufactures and sells CAD/CAM equipment for use in the shoe industry, and conducts related research. It produces NC molds and designs CAD systems for the manufacture of shoe uppers. NC machining of sculptured surfaces is another capacity of Cimtech.

CINCINNATI MILACRON - CANADA LTD

122 North Queen Street
Toronto, Ontario
M8Z 2E4

Telephone: (416) 233-3216

Chief Executive Officer: B. C. Taylor,
President

Activities: A supplier of complete systems for flexible manufacturing, Cincinnati Milacron's products include numerical control systems, computer-controlled machining centres, technical support, mini-computers, CNC hardware, backup equipment and robotics installations.

COMPU-DRAFT SERVICES LTD

620 - 2424 4th Street S.W.
Calgary, Alberta
T2S 2T4

Telephone: (403) 228-3538

Chief Executive Officer: Maurice Sunderland,
President

Size: 25 employees; annual sales between \$250 000 and \$2 million

Activities: Compu-Draft supplies computerized construction drawings for architectural, structural, mechanical, and electrical specifications; end-use design drawings for approvals; and working drawings for construction application. It conducts interactive structural analyses and designs computer programs that are used in the implementation of complex structural designs. It also offers base mapping capabilities to help in map generation and to computerize mapping data for subsequent retrieval and continuous editing. Compu-Draft has other expertise in the production of computerized PC board layouts, piping

and instrumentation design, and an interactive bill of materials system for the estimation of construction costs.

COMPUTER AIDED DESIGN SYSTEMS INC

3 Amberwood Crescent
Nepean, Ontario
K2E 7L1

Telephone: (613) 225-0411

Chief Executive Officer: P. J. Philliban,
General Manager

Senior Marketing Executive: G. W. Philliban

Size: eight employees; annual sales between \$250 000 and \$2 million

Activities: The company supplies CAD/CAM products and systems for mechanical, architectural and educational applications. Its computer-aided manufacturing products, such as MINN DRAFT and MILL TRAINER, serve needs within the education area; computer-aided design products, Design Graphix and three-dimensional Tutorial, fulfill end-use needs in mechanical and architectural applications. The company also represents other suppliers of CAD/CAM equipment and service, such as Gould DeAnza (Image Processing) and Lexidata Corporation (Raster Graphics Display Systems).

COMPUTER AIDED DRAFTING SERVICES LIMITED

5443 Rainnie Drive
Halifax, Nova Scotia
B3J 1P8

Telephone: (902) 429-6123

Chief Executive Officer: W. G. Campbell,
President

Senior Marketing Executive: C. S. Hart,
Secretary/Manager

Senior Consultants:

Barry Swift, Systems
Manager/Co-ordinator
Jennifer Myrden, Assistant Manager

Size: nine employees

Activities: This service bureau provides two-dimensional drafting training services to architectural, mechanical, electrical and structural firms. Either trained, in-house personnel prepare the drawings, or the company will train a firm's staff and place a terminal on its premises so it can do its own drawing preparation. It runs Holquin software (CAD 2000 package) on two HP 1000 F series computers. Other major facilities include three 7912 disk drives, three V8585 plotters, 7970 tape drives, and 15 HP terminals (seven remote and eight in-house).

CONTROL DATA CANADA LTD

1855 Minnesota Court
Mississauga, Ontario
L5N 1K7

Telephone: (416) 826-8640

Telememo: 610-492-4568

Telefax: 416-826-8640

Chief Executive Officer: T. S. Allan,
President

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

Branch Offices: Vancouver, Calgary, Edmonton,
Winnipeg, Toronto, Ottawa, Montréal,
Halifax

Size: 200 employees; annual sales over \$20 million

Activities: A subsidiary of Control Data Corporation of the U.S., the company develops large-scale computer-aided systems. Its Iclcm/Service offers

manufacturers a remote computing device with applications in design and drafting, solid and finite element modelling, and numerical control. Clients with installed turnkey CAD systems can link them with Control Data's direct translators, IGES interfaces and communications network. The company also offers a microcomputer-based system: the AutoCAD Workstation, which is sold complete or as add-on equipment for an existing workstation. AutoCAD applications include civil, electronics, and chemical engineering uses; drafting, graphics and systems design; office and factory layout; site safety; technical illustration; and other purposes.

CONTROMATIC AUTOMATION SERVICES LTD

7171 Torbram Road, Unit 9
Mississauga, Ontario
L4T 3W4

Telephone: (416) 673-2101

Chief Executive Officer: Joe Ferreira,
President

Size: 12 employees; annual sales between
\$250 000 and \$2 million

Activities: Contromatic is active in completely computer-controlled process systems with ceramics applications, from casting to parts finishing. It is developing a robotic system that will include Servo electric and pneumatic robots for application in assembly, pick and place, and painting.

CORPORATE COMPUTER SYSTEMS INC

500 Sheppard Avenue East
Suite 209
Willowdale, Ontario
M2N 6H7

Telephone: (416) 229-6477

Contact: Joe Czerlau, General Manager

Size: four employees; annual sales between
\$2 million and \$20 million

Activities: The company represents AutoDesk, Control Systems, Calcomp-Sanders (Canada), Houston Instruments, Kurta Corporation, Hitachi, Seiko and Amdek Electronics. Its products include AutoCAD software, Artist-1 graphics adapters, Calcomp 104X plotters and digitizers.

CYMBOL CYBERNETICS CORPORATION

169 Colonnade Road
Ottawa, Ontario
K2E 7J4

Telephone: (613) 727-1880

Telex: 053-3538

Chief Executive Officer: David Williams,
President

Senior Marketing Executive: J. D. Davies,
Vice-President

Size: 30 employees; annual sales between
\$2 million and \$20 million

Activities: Symbol supplies multiDRAW advanced two- and basic three-dimensional design and drafting software used by architects and engineers. When combined with the IBM PC AT, the resultant multiDRAW/AT offers an advanced Intel 80286 microprocessor, large memory configurations, high-capacity diskette

and fixed disk drives, and an advanced floating point arithmetic co-processor. Cymbol also supplies the multicUT software package, enabling interactive design and drawing of any two-dimensional shape and the automatic production of direct output to CNC XY cutting tables. Applications include HVAC ductwork and sheet metal cutting, milling machines and lathes.

DATA GENERAL (CANADA) INC

2155 Leanne Boulevard
Mississauga, Ontario
L5K 2K8

Telephone: (416) 823-7830

General Manager (Canada): Michael J. Toohey

Branch/Sales Offices: Vancouver, Calgary,
Edmonton, Winnipeg, Toronto, Ottawa,
Montréal, Halifax

Size: 230 employees; annual sales of more
than \$20 million

Activities: Data General is the Canadian subsidiary of a U.S.-based manufacturer of computer systems and equipment. It offers a broad range of 32-bit minicomputer and super-minicomputer products ranging from one-user to one-thousand-user configurations. It also offers a series of 32-bit distributed or stand-alone engineering workstations that have high-resolution graphics and are compatible with the entire range of Data General 32-bit systems. Data General has a comprehensive range of proprietary and industry standard network and communications software and an extensive library of graphics development tools and technical applications software. The DS Family of engineering and graphics workstations incorporates all of an engineer's daily functions --

engineering, scientific, managerial, and administrative tasks -- into one system. A choice of three operating systems, including native UNIX and Data General AOS/VS and AOS/DVS, are available on all workstations.

DATAMEX LTD

115 Norfinch Drive
Downsview, Ontario
M3N 1W8

Telephone: (416) 665-1808

Telex: 06-218338

Chief Executive Officer: D. Haruni,
President

Branch Offices: 3248 Beta Avenue
Burnaby, British Columbia
V5G 4K4

1615 10th Avenue S.W.
Calgary, Alberta
T3C 0J7

1570 Liverpool Court
Ottawa, Ontario
K1B 4L2

7005 Kildare Road
Côte-Saint-Luc, Quebec
H4W 1C1

Size: 45 employees; annual sales between
\$2 million and \$20 million

Activities: Datamex sells design systems, monochrome graphics display terminals and colour graphics hardcopy unit display systems. It is a distributor for Seiko Instruments, Genisco Computer and Intecolor Equipment.

DE VILBISS (CANADA) LTD

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

Telephone: (705) 728-5501

Chief Executive Officer: P. B. Popp,
President

Senior Engineering Executive: J. S. Watton

Size: 275 employees; annual sales of more
than \$20 million

Activities: This Canadian subsidiary of the
De Vilbiss Co, Toledo, Ohio, sells and
services the robotic manipulators made
by its parent for the finishing
industry.

DIGITAL EQUIPMENT OF CANADA LTD

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

Telephone: (613) 592-5111

Chief Executive Officer: K. B. Copeland,
President

Senior Marketing Executive: Leo Ditschun,
Marketing Manager

Branch Offices: Victoria, Vancouver,
Edmonton, Calgary, Regina, Winnipeg,
Sudbury, Sarnia, London, Kitchener,
Hamilton, Toronto (3), Ottawa,
Kingston, Montréal, Québec, Dartmouth

Size: 2250 employees; annual sales of more
than \$20 million

Activities: Canada's largest manufacturer of
minicomputers and a leader in
time-sharing systems, Digital is also a
major designer and supplier of a range

of computer systems, peripheral
equipment, interfacing devices,
software packages and support services.
Its traditional markets include
engineering, science and education; and
manufacturing exports account for a
large portion of its activity. In
addition to its on-going research and
development program, Digital operates
four CAD/CAM centres. The company is a
wholly-owned subsidiary of Digital
Equipment Corporation of Maynard,
Massachusetts.

DIGITAL GRAPHICS

Division of Helix Circuits Inc
90 Don Park Road
Markham, Ontario
L3R 1C4

Telephone: (416) 475-9633

Telex: 06-986843

Chief Executive Officer: Fred Long,
President

Senior Consultant: Fern Reid, Vice-President

Branch Plant: 1725 St Laurent Boulevard
Suite 212
Ottawa, Ontario
K1G 3V4

Branch Office: Sturbridge, Maine, U.S.A.

Size: 48 employees; annual sales between
\$2 million and \$20 million

Activities: This subsidiary of Helix Circuits
Inc, Montréal, supplies digital designs
and printed circuits board artwork and
documentation for the electronics
industry. It provides its services
through the application of a variety of
CAD systems.

DOCUMENTED CIRCUITS INC

1555 Sydenham Road
Kingston, Ontario
K7L 4V4

Telephone: (613) 549-5522
Telex: 066-3223

Chief Executive Officer: Don Case, President

Branch Offices: 2780 Princess Street
Kingston, Ontario
K7M 6P9

1 State Street
Hartford, Connecticut
U.S.A.

Size: 80 employees; annual sales between
\$250 000 and \$2 million

Activities: The company provides CAD systems
design for the electronics industry in
Canada and the U.S., and conducts
research and development.

DYNAMATION CORPORATION

P.O. Box 231
Station U
Toronto, Ontario
M8Z 5P1

Telephone: (416) 927-0800

Chief Executive Officer: B.C. Bourne,
President

Size: two employees; annual sales of up to
\$50 000

Activities: This young company provides
expertise in the field of educational
robotics, and designs, manufactures and
sells related products.

ELECTRO SYSTEMS GROUP LTD

535 Berry Street
Winnipeg, Manitoba
R3H 0R9

Telephone: (204) 772-9411
Telex: 07-587843

Chief Executive Officer: H. M. Holroyde,
President

Size: four employees; annual sales between
\$250 000 and \$2 million

Activities: Electro Systems distributes the
plotters and digitizers produced by
C. Itoh and Calcomp.

ENERGRAPHICS SOFTWARE SYSTEMS INC

1865 Leslie Street, Suite 202
Don Mills, Ontario
M3B 2M4

Telephone: (416) 445-8112

Chief Executive Officer: Paul Gastman,
President

Senior Marketing Executive: Allan Livingston,
Director

Senior Engineering Executive:
Frank Miglietta, Technical Director

Size: six employees

Activities: Energraphics is the Canadian
representative for the products of
Polaroid Palette, Enertronics and
Image. It also designs, manufactures
and installs complete systems to meet
customer needs.

EPIC DATA INCORPORATED

7280 River Road
Richmond, British Columbia
V6X 1X5

Telephone: (604) 273-9146
Telex: 043-55701

Chief Executive Officer: Helmut Eppich,
President

Senior Marketing Executive: Norm Cafik,
General Manager and Vice-President

Branch Offices: Toronto; and Wilmington,
Delaware, Chicago, New Orleans and Los
Angeles (U.S.A.)

Size: 150 employees; annual sales of more
than \$15 million

Activities: This company provides
computerized data collection systems
for job costing, material control,
department costing and portable
inventory recording.

FACILITIES MANAGEMENT INC

161 Eglinton Avenue East, Suite 801
Toronto, Ontario
M4R 1A8

Telephone: (416) 486-8504

Chief Executive Officer: D. Felicant,
President

Senior Marketing Executive: Cal Watson,
Marketing Manager

Size: 18 employees; annual sales between
\$2 million and \$20 million

Activities: The company supplies complete
turnkey systems, distributing
manufacturing software and hardware.
It is a representative for Autodesk and
AutoCAD systems.

FISCHER NOVATECH INC

2065 Dundas Street East
Mississauga, Ontario
L4X 1M2

Telephone: (416) 625-8292
Telex: 06-961478

Chief Executive Officer: E. R. Fischer,
President

Senior Marketing Executive: R. N. Fischer,
Vice-President

Senior Engineering Executive:
William McEachern

Branch Office: 7 - 2404 Haines Road
Mississauga, Ontario
L4Y 1Y6

Size: 11 employees; annual sales between
\$250 000 and \$2 million

Activities: Fischer is a consulting operation
with expertise in CNC programming and
estimation software packages.

G.A. COMPUTER LTD

Division of Genamation Inc
351 Steelcase Road West
Markham, Ontario
L3R 3W1

Telephone: (416) 475-9434
Telex: 610-492-4450

Chief Executive Officer: R. J. Pritchard,
President

Branch Offices: Vancouver, Ottawa, Montréal

Size: 45 employees; annual sales between
\$2 million and \$20 million

Activities: G.A. Computer supplies turnkey computerized control systems for industrial automation, numerical control equipment and product testing.

G.E.C. CANADA LTD

5112 Timberlea Boulevard
Mississauga, Ontario
L4W 2S5

Telephone: (416) 624-8300

Telex: 06-961280

Chief Executive Officer: R. D. Mere,
President

Branch Offices: Vancouver, Calgary, Montréal

Branch Plant: Vancouver

Size: 200 employees; annual sales of more than \$20 million

Activities: G.E.C. supplies a variety of programmable control systems for such applications as compressor monitoring, water pumping and treatment, washer control, machine controls for chocolate manufacturing, door security and relay scheme monitoring. Additional expertise includes variable speed AC/DC drives and robotics.

GENAMATION INC

351 Steelcase Road West
Markham, Ontario
L3R 3W1

Telephone: (416) 475-9434

Telex: 06-986206

Chief Executive Officer: R. J. Pritchard,
President

Senior Marketing Officer: G. B. Giddings,
Vice-President

Branch Offices: Vancouver, Ottawa, Montréal

Size: 44 employees; annual sales between \$2 million and \$20 million

Activities: Genamation supplies industrial minicomputers made by General Automation in Anaheim, California, for manufacturing applications. It also provides integration assistance for A/D and D/A front-end equipment, and custom real-time software development.

GERMAN AND MILNE INC

Place de Ville, Tower B
112 Kent Street, 15th Floor
Ottawa, Ontario
K1P 5P2

Telephone: (613) 230-6201

Telex: 053-44-99

Telefax: 236-5614

Chief Executive Officer: C. J. Klop,
President

Size: 35 employees

Activities: German and Milne Inc are naval architects, marine engineers and transportation consultants. Their activities include ship design, contract design and working drawings, computer applications, research and development, systems approach to design, appraisals and consulting services. The company uses computer-aided engineering and computer-aided drafting for engineering drawings in the design of new or rebuilt vessels.

GILES TOOL AGENCIES LTD

47 Granger Avenue
Scarborough, Ontario
M1K 3L1

Telephone: (416) 267-1111

Chief Executive Officer: George B. Giles

Senior Marketing Executive: David G. Sparks,
Sales Manager

Senior Engineering Executive:
Joseph McCallion

Branch Plant: 6520 Lawrence Avenue East
West Hill, Ontario
M1C 4A7

Size: 70 - 80 employees; annual sales between
\$2 million and \$20 million

Activities: Giles concentrates on
computer-assisted manufacturing,
although future expansion may also
include computer-assisted design areas.
Among its products and systems are CNC
lathes and milling machines.

GROSS MACHINERY GROUP

18 Jarvis Street
Toronto, Ontario
M5E 1N1

Telephone: (416) 364-7161

Telex: 065-24106

Telefax: 416-367-3464

Chief Executive Officer: Michael Gross,
President

Senior Marketing Executive: Michael Lishnak,
Vice-President

Branch Offices: Vancouver, Edmonton, Calgary,
Winnipeg, Montréal, Charlottetown; and
Tokyo, Japan

Size: 65 employees; annual sales of more than
\$20 million

Activities: Gross supplies NC machine tools
and represents Fujitsu, IHI (for
fabricating), Komatso, Mitsubishi Heavy
Industries, Mori-Seiki, OKK, O-M Ltd.
SNK (for profiling and aerospace),
Leblond-Makino, Voest, Yoneda and
Yoshida. Its expertise is in CAM and

integrated manufacturing, particularly
flexible manufacturing cells and
systems, FMC/FMS. Within this area it
supplies robotics and materials
handling equipment and systems, as well
as AGV systems and the linking of
hardware and software. It is
especially active in manufacturing
environments requiring machine tools,
high-density retrieval/guided vehicle
systems and unmanned manufacturing
systems.

GUNNAR A. JACOBSON ASSOCIATES

785 Plymouth Avenue
Montréal, Quebec
H4P 1B3

Telephone: (514) 731-1156

Contact: Gunnar A. Jacobson

Activities: Jacobson designs, produces and
installs complete CAD software systems.
It also provides consulting services,
conducts research and development and
offers product design and automated
drafting expertise.

HEWLETT-PACKARD (CANADA) LTD

6877 Goreway Drive
Mississauga, Ontario
L4V 1M8

Telephone: (416) 678-9430

TWX: 2014

Chief Executive Officer: Malcolm I. F.
Gissing, President

Senior Marketing Executive: Sherif Alaily

Branch Offices: Victoria, Richmond (B.C.),
Calgary, Edmonton, Saskatoon, Winnipeg,
London (Ont.), Burlington (Ont.),
Kirkland (Que.), Dartmouth (N.S.)

Size: 1152 employees; annual sales of more than \$20 million

Activities: Hewlett-Packard designs, manufactures and sells CAD/CAM systems and products. In the area of manufacturing, it supplies three- and five-axis numerical controls for use in conjunction with two- and three-dimensional mechanical CAD. These include the NC 36 and Anvil 4000. Hewlett's CAD systems include HP EGS, HP Draft, and Anvil 4000 for a variety of end uses. Applications for these include isometrics, plant and printed circuit board layouts, schematics, assembly and two-dimensional mechanical drawing systems with NC/FEM interfaces.

H.G. ENGINEERING

260 Lesmill Road
Don Mills, Ontario
M3B 2T5

Telephone: (416) 447-5535

Telex: 06-966807

Chief Executive Officer: P. H. Griggs,
President

Senior Marketing Executive: Diane Merrick,
Sales Manager

Senior Engineering Executive: A. Firmin,
Vice-President

Size: 20 employees; annual sales between \$250 000 and \$2 million

Activities: H.G. Engineering supplies FESDEC, a finite element system for desktop computers, and provides computer-aided analysis services. End uses are mechanical parts and civil structure analyses and auto parts applications.

HITACHI DENSHI (CANADA) LTD

65 Milford Drive
Scarborough, Ontario
M1B 2G6

Telephone: (416) 299-5900

Telex: 652-5324

Telefax: 299-0450

Chief Executive Officer: Akio Kobayashi

Senior Marketing Executive: Len Gratton,
Manager

Senior Engineering Executive:
Ross de la Cruz

Branch Offices: Calgary, Nepean (Ont.) and
Saint-Laurent (Que.)

Size: 50 employees; annual sales between \$2 million and \$20 million

Activities: Hitachi Denshi manufactures and markets CAD/CAM products and systems, including displays and digitizers.

IBM CANADA LTD

3500 Steeles Avenue East
Markham, Ontario
L3R 2Z1

Telephone: (416) 474-2111

Telex: 06-9666574

Chief Executive Officer: Lorne Lodge,
Chairman

Branch Offices: 100, in all major Canadian
cities

Size: 11 000 employees; annual sales of more than \$20 million

Activities: A subsidiary of International Business Machine Corporation of Armonk, New York, IBM Canada manufactures and sells numerical control programming

systems, as well as production and inventory control systems. A major research and development company, IBM also designs systems and provides consulting services. Cadam Inc and Dassault Systems are two of the companies it represents.

ICAM TECHNOLOGIES CORP

1900 Des Sources Boulevard
Pointe-Claire, Quebec
H9R 4Z3

Telephone: (514) 697-8033

Chief Executive Officer: J. J. Nassr,
President

Size: 35 employees; annual sales between \$2 million and \$20 million

Activities: ICAM supplies manufacturing equipment and services such as the five-axis APT processor (with sculptured surfaces) software, tool-path graphic plotters, punch processors, APT time sharing, NC/APT programming, and interactive post-processor generator software. Applications for the company's products include NC machine tools and airplane parts. ICAM also supplies both manufacturers and educational institutions with APT programming graphic Tutorial software.

INDIGO SOFTWARE LTD

1280 Wellington Street
Ottawa, Ontario
K1Y 3A7

Telephone: (613) 728-0016

Senior Engineering Executive: R. F. Allum,
Vice-President

Size: 15 employees; annual sales between \$250 000 and \$2 million

Activities: Indigo's capabilities include the design and installation of complete production-line software systems, with particular emphasis on electrical CAD/CAM requirements. Indigo is also active in interactive graphics simulation design for such applications as printed circuit boards, plant layout and postal route design. Database design and micro-based workstations are additional areas of the company's expertise.

INNOVATIVE TECHNOLOGY INC

2387 Blackstone Crescent
Ottawa, Ontario
K1B 4H3

Telephone: (613) 521-8391

Chief Executive Officer: L. G. Woolsey,
President

Senior Engineering Executive: M. E. Thornber,
Vice-President

Size: 6 employees; annual sales between \$50 000 and \$250 000

Activities: The company provides CAD consulting services in several areas: computer programming, schematic capture and CAD peripheral interfacing for PCB and LSI-IC design end uses. Terminal driver programming and human interface services are available for LSI-IC design. The company has developed National Master Specification spec-writing word-processor software for the writing of architectural and engineering construction specifications. It also has capabilities in two- and three-dimensional architectural design.

INSTRUMENT RENTALS CANADA

6815 Rexwood Road, Unit 6
Mississauga, Ontario
L4V 1R2

Telephone: (416) 678-7831
Telex: 06-968884

Chief Executive Officer: B. R. Payne,
President

Senior Marketing Executive: C. Marshall,
National Sales Manager

Senior Engineering Executive: J. Reyes,
Inventory Control Manager

Branch Offices: Edmonton, Ottawa, Montréal

Size: 30 employees; annual sales between
\$2 million and \$20 million

Activities: The company sells, rents and
leases products for electronics design.
It represents the following
manufacturers: P/CAD Systems,
FutureNet, Tektronix, Nicolet, Fluke,
Watanabe, Epson, Intel and Hewlett
Packard.

INTERAUTOMATION LTD

2630 Royal Windsor Drive
Mississauga, Ontario
L5J 1K7

Telephone: (416) 823-3600
Telex: 06-982294

Chief Executive Officer: G. S. Bagosy,
President

Senior Marketing Executive: D. Edwards,
Manager, Marketing and Sales

Senior Engineering Executive: O. Orbach,
Manager of Systems Engineering

Branch Office: Livonia, Michigan, U.S.A.

Size: 40 employees; annual sales between
\$2 million and \$20 million

Activities: Interautomation supplies
production monitoring and maintenance
management systems for the automotive
industry, and engine and transmission
test systems for the automotive and oil
industries.

INTERFAX SYSTEMS INC

3395 American Drive, Unit 12
Mississauga, Ontario
L4V 1T5

Telephone: (416) 671-3920
Telex: 06-983693

Chief Executive Officer: Bryon Wilson

Senior Marketing Executive: Kim Etherington

Senior Engineering Executive: Andy Haber

Branch Offices: Burnaby (B.C.), Calgary,
Nepean (Ont.), Saint-Laurent (Que.)

Size: 22 employees; annual sales between
\$2 million and \$20 million

Activities: Interfax supplies computer-aided
design products and services for end
use in electronics manufacturing
companies. The company is also a
representative for Personal CAD Systems
of Los Gatos, California. Interfax
markets PCAD/CAE for schematic design,
PCAD/PCB for printed circuit board
layout, and PCAD/EDA for schematics,
logic simulation and board layout.

INTERGRAPH SYSTEMS LTD

3115 - 12th Street N.E.
Calgary, Alberta
T2E 7J2

Telephone: (403) 250-3626
Telex: 03-824618

Chief Executive Officer: John Mostert,
President

Senior Marketing Executive: George Church,
Executive Assistant

Senior Engineering Executive: Glen Le Baron,
National Customer Service Manager

Branch Offices: Victoria, Vancouver,
Edmonton, Saskatoon, Mississauga,
Montréal, Fredericton

Size: 125 employees; annual sales of more
than \$20 million

Activities: A subsidiary of Intergraph Corporation of Huntsville, Alabama, Intergraph supplies a wide line of products, and its Canadian sales focus on mapping and AEC markets, including some mechanical and electrical design applications. It sells Versatec plotters and turnkey systems based on the Digital VAX computer. Intergraph has considerable expertise in mechanical design, architectural modelling and production drawings, civil and structural engineering and facilities management.

INTERNATIONAL CUTTING TOOLS INC

10833 Place Moisan
Montréal, Quebec
H1G 4N6

Telephone: (514) 324-3720
Telex: 05-828658

Chief Executive Officer: Al Minicozzi,
President

Senior Marketing Executive: Gus Minicozzi,
Vice-President

Branch Plant: 75 Main Street
Beebe, Quebec
JOB 1E0

Size: 140 employees; annual sales between
\$2 million and \$20 million

Activities: International Cutting Tools Inc uses NC and CAM to produce cutting tools -- drills, tapes, reamers and end mills -- for the aerospace industry. It has developed a new end mill design which has been patented in 10 countries and is in demand by the aerospace industry and other industries.

I.P. SHARP ASSOCIATES LIMITED

2 First Canadian Place
Suite 1900
Toronto, Ontario
M5X 1E3

Telephone: (416) 364-5361
Telex: 06-22259 I-P-SHARP-TOR

Chief Executive Officer: Ian P. Sharp,
President

Senior Marketing Executive: D. B. H. Scott,
Product Manager, Special Systems
Division

Activities: I.P. Sharp is the developer and supplier of PROMIS software, a completely integrated manufacturing system that offers ongoing updates and provides real-time monitoring and control of complex manufacturing processes. PROMIS has modular architecture and is easily customized. It offers automated interfaces to both process and test equipment, and features automated facilities monitoring to prevent misprocessing before it occurs. Its end uses include integrated circuit manufacturing, hybrid and IC assembly operations, discreet devices, ROM and gate array generic device support, and mask-making. I.P. Sharp draws its professional support staff from the hardware and software fields and from semi-conductor manufacturing.

KEUFFEL & ESSER CANADA INC

1630 50th Avenue
Lachine, Quebec
H8T 2V5

Telephone: (514) 636-8810
Telex: 05-821764

Chief Executive Officer: R. G. Scully,
Managing Director

Branch Offices: Scarborough (Ont.), Ottawa,
Québec

Branch Plant: Granby (Que.)

Size: 105 employees; annual sales between
\$2 million and \$20 million

Activities: The company manufactures plain,
sprocketed and dielectric plotting
equipment, and pen points for plotting
in all configurations. It also
supplies media equipment: film, report
grade and translucent vellum.

KEYNOTE COMPUTER PRODUCTS INC

145 Columbia Street West
Waterloo, Ontario
N2L 3L2

Telephone: (519) 884-3440

Senior Marketing Executive: Fraser Moull,
Vice-President

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

Activities: Keynote designs, manufactures and
sells computer products and systems,
and supplies the Tektronix
4010-compatible terminal. It is also
active in research and development.

KOH-I-NOOR RAPIDOGRAPH INC

1815 Myerside Drive
Mississauga, Ontario
L5T 1G3

Telephone: (416) 671-0696
Telex: 06-968691

Chief Executive Officer: D. Grant, General
Manager

Senior Marketing Executive: W. Kingsland

Size: 15 employees; annual sales between
\$2 million and \$20 million

Activities: Koh-i-Noor, a subsidiary of
Koh-i-Noor Rapidograph Inc, Bloomsbury,
New Jersey, supplies and manufactures
plotter points and accessories.

MANUFACTURING DATA SYSTEMS LTD

501 - 6711 Mississauga Road
Mississauga, Ontario
L5N 2W3

Telephone: (416) 821-3400

Chief Executive Officer: J. S. Wallace,
President

Senior Marketing Executive: P. L. Markham,
Sales Manager

Senior Engineering Executive: A. Evans,
Technical Services Manager

Branch Office: Anjou (Que.)

Size: 15 employees; annual sales between
\$2 million and \$20 million

Activities: A subsidiary of Manufacturing
Data Systems Inc, Ann Arbor, Michigan,
this company supplies Equinox System
equipment for use in process
engineering, numerical control
programming, and the design of tools,
products and facilities.

MANUFACTURING TECHNOLOGY CENTRE OF NEW BRUNSWICK

New Brunswick Ministry of Commerce and Development
P.O. Box 6000
Fredericton, New Brunswick
E3B 5H1

Telephone: (506) 452-8994

Telex: 014-46115

Chief Executive Officer: Ray Boorman,
Director

Senior Consultants:

Peter Lowell, Manager, Industry Services
Hugh Drummond, Manager, Engineering Division
Neville Coelho, Manager, Manufacturing Technology Centre (Research and Productivity Council)
John F. Hanusiak, CAD/CAM Centre Manager, Moncton Campus, New Brunswick Community College
Jocelyn Vienneau, CAD/CAM Centre Manager, Bathurst Campus, New Brunswick Community College
S. H. Brittain, CAD/CAM Centre Manager, Saint John Campus, New Brunswick Community College
David Bonham, Chairman, Mechanical Engineering Department, University of New Brunswick
Evelyn W. Richards, Director, Manufacturing Technology Centre, University of New Brunswick
Charles Cormier, System Manager, Manufacturing Technology Centre, University of Moncton

Activities: The centre has six installations throughout New Brunswick and has plans for another in Edmundston. It was established through the co-operation of the Ministry of Commerce and Development, New Brunswick Community College, the University of Moncton, the University of New Brunswick and the

Research and Productivity Council. Its objectives are to provide technical advice to existing and potential new industry, with a special emphasis on small- and medium-sized firms, and to carry out research and development. At present, its main focus is on industrial engineering problems and software development.

MATROX

1055 Saint-Régis Boulevard
Dorval, Quebec
H9P 2T4

Telephone: (514) 685-2630

Telex: 05-822798

Chief Executive Officer: Branko Matic

Senior Marketing Executive: Gerry Sullivan

Senior Engineering Executive: Abel Ferreira

Size: 250 employees; annual sales of more than \$20 million

Activities: Matrox manufactures a range of board-level colour graphics controllers and generators designed for the CAD/CAM market.

MCDONNELL DOUGLAS ISG

34 Adelaide Street West
Toronto, Ontario
M5H 1L6

Telephone: (416) 863-6919

Chief Executive Officer: Phillip W. Taylor

Senior Marketing Executive: Henry Ber,
Marketing Representative

Senior Engineering Executive: Brian White

Size: six employees; annual sales between \$250 000 and \$2 million

Activities: This affiliate of McDonnell Douglas Automation Company (McAuto) is a Canadian subsidiary of McDonnell Douglas ISG, St Louis, Missouri. It provides consulting services and markets integrated civil and structural design and drafting systems used to simplify base map creation and to speed engineering design. Markets include the architectural and engineering industries.

MDDC SYSTÈMES LTÉE

75 Hymus Boulevard
Pointe-Claire, Québec
H9R 1E2

Telephone: (514) 697-3307
Telex: 05-8235166
Telefax: 514-694-6305

Chief Executive Officer: K. L. Lukanovich

Senior Marketing Executive: J. M. Longworth

Senior Engineering Executives: S. M. Egan;
P. Lee

Size: 37 employees; annual sales between \$50 000 and \$250 000

Activities: A subsidiary of Measure Corporation, Cupertino, California, MDDC operates in all aspects of CIM. It designs, furnishes and installs paper-making production-line systems for order processing, production planning, usage and jumbo control, roll tracking, finishing, and quality and warehouse control. Its systems and products include LABELmate automatic label applicators, CompuSCAN video roll identification systems, and CompuMARK Intelligent Ink-Jet stenciling systems. The company's Usage Control collects and processes data required to identify production costs incurred, from stock preparation to shipping. Jumbo Control links paper machine production data with roll production and paper quality information.

MEGATRONIX INC

3640 Weston Road
Weston, Ontario
M9L 1W2

Telephone: (416) 742-8015
Telex: 065-27312
TWX: 610-492-6150

Chief Executive Officer: Gerry Lokash,
President

Senior Marketing Executive: Douglas Aitken,
Sales Manager

Senior Engineering Executive: Alan Rosenthal,
Chief Engineer

Branch Offices: Calgary, Ottawa, Montréal

Size: 15 employees; annual sales between \$2 million and \$20 million

Activities: Megatronix supplies a variety of hardware, acting as a representative for several U.S. manufacturers of Ink-Jet printers, plotters, graphics display terminals, full-colour graphics systems and digitizers. It also supplies complete CAD and graphics software packages.

MERLAN SCIENTIFIC LTD

247 Armstrong Avenue
Georgetown, Ontario
L7G 4X6

Telephone: (416) 877-0171

Chief Executive Officer: David Whiting,
President

Senior Marketing Executive: John McLean,
Product Manager

Branch Offices: 5115 East Georgia Street
Burnaby, British Columbia
V5B 1V2

47 Place Louis-Hémond
Blainville, Quebec
J7C 3L5

Size: 11 employees; annual sales between
\$2 million and \$20 million

Activities: Merlan supplies CADAPPLE and
VersaCAD entry-level systems for use in
educational institutions and as a
computer interface for lathe machines.
It provides turnkey systems for
applications in APPLE and IBM
micro-based equipment, and represents
the products of T & W Systems,
Huntington Beach, California.

MICOS COMPUTER SYSTEMS INC

1295 Eglinton Avenue East
Mississauga, Ontario
L4W 3E6

Telephone: (416) 624-0320
Telex: 06-960118

Chief Executive Officer: Robert Brown,
President

Senior Marketing Executive:
Rudie Nagelmakers, Vice-President

Branch Offices: Vancouver, Winnipeg, London
(Ont.), Saint-Laurent (Que.)

Size: 54 employees; annual sales between
\$250 000 and \$2 million

Activities: Micos supplies products and
systems produced by Fujitsu America,
Storage Technology, Emulex, Cambex,
Trimm Industries and Spectra Logic.
Its manufacturing and design equipment
includes Winchester discs for mag tape
transports and host interfaces for both
storage back-up and DEC/D.G./P.E./T.I.
interfaces.

MICRO-AUD SYSTEMS INC

101 Trillium Drive
Kitchener, Ontario
N2E 1W8

Telephone: (519) 893-1060
Telex: 06-955193

Chief Executive Officer: Klaus Woerner

Senior Marketing Executive: Roger Awad,
Marketing Manager

Senior Engineering Executive: Robert Harris

Branch Office: 175 Old Half Day Road
Lincolnshire, Illinois
60069 U.S.A.

Size: seven employees; annual sales between
\$250 000 and \$2 million

Activities: In addition to its on-going
research and development program,
Micro-Aud designs, manufactures,
furnishes and installs complete
production-line systems and products to
fulfill customer needs. Its products
and services include real-time
manufacturing information collection
and reporting systems. The
applications include telecommunica-
tions, military avionics and
electronics. The company's general
areas of involvement include the
following: data acquisition, robotics
integration, CNC/DNC controls, circuit
design, digital/analogue controllers,
microprocessor systems support and
process management instrumentation.

**MICRO CAD/CAM SYSTEMS
DIVISION OF HODDENBAGH, HORTON & ASSOCIATES
LIMITED, CONSULTING ENGINEERS**

306 Dundas Street West
Whitby, Ontario
L1N 2M5

Telephone: (416) 683-2144

Chief Executive Officer: John Hoddenbagh,
P.Eng, President

Senior Marketing Executive: Alan R. Williams,
AutoCAD Applications Specialist,
consulting Engineer (Civil)

Size: four employees; annual sales between
\$250 000 and \$2 million

Activities: Micro specializes in AutoCAD
computer-aided drafting and design
systems, providing both training and
service consultation as a sales
follow-up. End users of its products
include architects, electrical/
electronic and structural engineers,
manufacturing plants and land
surveyors. Micro foresees an increase
in its CAM activity.

MICROTEL PACIFIC RESEARCH

8999 Nelson Way
Burnaby, British Columbia
V5A 4A5

Telephone: (604) 294-1471

Chief Executive Officer: Bruce Hartwick,
President

Activities: Microtel has a research and
development facility which conducts
design and engineering testing in
telecommunications technology and
develops high-level languages for VLSI
design. It also has a clean room,
equipped for thick and thin film and
grate-array metallization, and a

complete IC design facility. In-house
software programs are Silicon Design
Language for IC design, and AGE for IC
design and layout, which use
interactive graphics and algorithmic
language. Microtel's hardware includes
an Apollo, an IBM 4381 and DEC VAX
11/780, 11/750.

MIMIK INC

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

Telephone: (519) 621-8010

Telex: 069-59430

Chief Executive Officer: L. S. Major,
Chairman

Size: 60 employees; annual sales between
\$2 million and \$20 million

Activities: Mimik manufactures tracer
equipment and the Datadrive CNC
conversion system for machine tools,
such as milling machines and manual
vertical turret lathes and drills. CNC
conversion is particularly attractive
for small job shops, and for specialty
industries in the aircraft, oil, glass
and farm machinery fields.

MODERN AUTOMATION CORP

3209 Rymal Road
Mississauga, Ontario
L4Y 3B8

Telephone: (416) 848-1611

Chief Executive Officer: Frank H. Matchett,
President

Size: nine employees; annual sales between
\$250 000 and \$2 million

Activities: An automation consultant, Modern
Automation advises in areas requiring
design expertise. It provides CAD

educational services to schools of engineering, conducts feasibility studies for both engineering and architectural purposes, devises application implementation formats and draws up planning schedules for engineering end uses.

MONENCO ENTERPRISES LIMITED

2045 Stanley Street
Montréal, Québec
H3A 2V4

Telephone: (514) 286-3664
Telex: 055-60735

Chief Executive Officer: James Leslie,
President

Senior Marketing Executive: Franco Grasso,
Manager of Marketing

Branch Offices: One St Paul Street
St Catharines, Ontario
L2R 7J9

400 Monenco Place
801 6th Avenue S.W.
Calgary, Alberta
T2G 3W3

Size: annual sales between \$2 million and
\$20 million

Activities: Monenco develops CAD programs to simplify facilities management. For example, two- and three-dimensional capabilities are applied to design and mapping, modelling and expansion for airport planning; and to the management of layout data, services, maintenance and operations inventories for building construction. Monenco has special CAD application expertise in utility records conversion.

MOSAID INC

P.O. Box 13579
Kanata, Ontario
K2K 1X6

Telephone: (613) 836-3134
Telex: 053-4986

Chief Executive Officer: R. C. Foss,
President

Senior Engineering Executive: William
Woodley, Business Unit Manager

Branch Office: 130 - 3375 Scott Boulevard
Santa Clara, California
95051 U.S.A.

Size: 40 employees; annual sales between
\$250 000 and \$2 million

Activities: Mosaid licenses and supplies MOS transistor device modelling, parameter extraction, and MOS circuit simulation systems, primarily for the semi-conductor industries. It also conducts research and development and provides consulting services.

MOTION CONTROL SYSTEMS INC

4009 Weston Road
Weston, Ontario
M9L 2S8

Telephone: (416) 743-7930
Telex: 065-27411

Chief Executive Officer: Kevin Quinn,
President

Branch Offices: Windsor, Ottawa

Size: seven employees; annual sales between
\$250 000 and \$2 million

Activities: Motion Control provides CAM products and services for such applications as component insertion for

PCB odd-shaped parts, machine control for large wheel manufacturing, and robot control applicable to the manufacture of robots to achieve variable torque and flexibility. It is the Canadian supplier for the CAM products of International Cybernetics Corporation, Pittsburgh, Pennsylvania.

NICOLET INSTRUMENT CANADA INC

1200 Aerowood Drive
Unit 1
Mississauga, Ontario
L4W 2S7

Telephone: (416) 625-8302
Telex: 06-960126

Senior Marketing Executive: J. A. Courtney,
National Sales Manager

Branch Office: 6007 - 1A Street S.W.
Calgary, Alberta
T2H 0G5

Size: 22 employees; annual sales between
\$2 million and \$20 million

Activities: Nicolet, a subsidiary of Nicolet Instrument Corporation, Madison, Wisconsin, supplies digital pen plotters used for drafting and engineering drawing.

NOMAD COMPUTER SYSTEMS CORP

10744 - 124th Street
Edmonton, Alberta
T5M 0H1

Telephone: (403) 451-5382

Chief Executive Officer: W. J. Marvel,
President

Senior Marketing Executive: G. B. Durocher,
Vice-President

Branch Offices: Calgary, Ottawa, Montréal

Size: eight employees; annual sales between
\$250 000 and \$2 million

Activities: Nomad supplies VersaCAD two- and three-dimensional drafting and design software, and represents T & W Systems, AutoDesk, Cubicomp and Omnicad, in Canada. Applications include architectural/structural engineering drawings; scheduling and organizational charts; machine, mechanical, and building layout design and drawings; and schematics piping and electrical drawings.

NORPAK CORPORATION

10 Hearst Way
Kanata, Ontario
K2L 2P4

Telephone: (613) 592-4164
Telex: 053-4174

Chief Executive Officer:
Dr. James F. Carruthers

Senior Marketing Executive: John Lugsdin

Senior Engineering Executive: Norman Smyth

Size: 96 employees; annual sales between
\$2 million and \$20 million

Activities: Norpak designs, manufactures and installs CAD/CAM products and systems. It also acts as a consultant, and conducts research and development.

NORTHWAY MAP TECHNOLOGY LIMITED

9 Prince Andrew Place
Don Mills, Ontario
M3C 2H2

Telephone: (416) 441-6025
Telex: 06-217622

Chief Executive Officer: J. W. L. Monaghan,
President

Senior Marketing Executive:

J. Alexander Miller

Senior Engineering Executive: Ian K. Isaacs

Size: 60 employees; annual sales between \$2 million and \$20 million

Activities: These focus on computer-aided software design for applications in geographic information systems. Northway represents the products of ESRI Canada Limited and its California parent company.

NORTH WESTERN TECHNOLOGY LTD

Centre for Advanced Resource Technologies (CART)
1789 Ogilvie Street
Prince George, British Columbia
V2N 1W7

Telephone: (604) 564-2662

Chief Executive Officer: Edward Cinitis,
Managing Director

Senior Consultants:

T. Michael Colliyer, Applications Engineer
Frank Penny, Applications Engineer
Harry Powell, Applications Engineer

Activities: The Centre for Advanced Resource Technologies was established to foster the improvement of productivity in forestry, mining and related industries by facilitating the application of advanced technology. It provides demonstrations of new technologies; training and upgrading of managerial skills to permit use of the technology; bridging between designers, manufacturers and end users of technology applications; and consulting services regarding applications of advanced technology and ready access to the equipment.

NOVA SCOTIA CAD/CAM CENTRE

Technical University of Nova Scotia
P.O. Box 1000
Halifax, Nova Scotia
B3J 2X4

Telephone: (902) 429-8300

Chief Executive Officer: Dr Aftab A. Muffi,
Director

Senior Marketing Executive: Leigh Beauchamp,
Marketing Manager

Senior Consultants:

V. G. Bustin, Assistant Director,
CAD/CAM Services
Dr Nader Zamanl, Manager of Research
and Development
William Bugg, Senior NC Engineer

Activities: The centre encourages design and manufacturing industries to apply CAD/CAM technologies to production processes. It offers training and consultation services and its research interests include computer graphics, finite element modelling and analysis, solid modelling and numerical control. It uses CDC, Prime and Cybernet software on CDC-825, VAX 780 and 750, and Prime 750 equipment.

OMNICAD INC

800 - 2050 Mansfield Street
Montréal, Quebec
H3A 1Y9

Telephone: (514) 842-6473

Telex: 055-60346

Senior Engineering Executive: Steven Murton,
Supervisor

Branch Office: Two Robert Speck Parkway
Suite 750
Mississauga, Ontario
L4Z 1H3

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

Activities: Omnicad specializes in consulting and design functions, and represents, in Canada, Advanced System Consultants of Cambridge, England. Its services include design/time-sharing and software for cryogenic and chemical process plants, aluminum smelters and shipbuilding. It is also a consultant in plant design and product development.

ONTARIO CAD/CAM CENTRE

400 Collier-McMillan Drive
Cambridge, Ontario
N1R 7H7

Telephone: (519) 622-3100

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

Senior Marketing Executive: G. R. Hedges,
Manager, Client Services

Senior Consultants:

Reinhard Kunze, Manager, Applications
Engineering
Andrew Uplian, Manager, Technical
Services
Jack Williamson, Assistant Manager,
Consulting Service

Size: 43 employees; 2800-square-metre facility

Activities: An arm of the Ontario Centre for Advanced Manufacturing, the centre aims to encourage the industrial application of CAD/CAM, CID and similar technologies through promotional programs aimed at public awareness and education. Its services include CAD/CAM demonstration projects to produce designs drawings and project models; preparation of detailed hardware and software support

specifications, and benchmarks for use in system evaluation and selection; implementation of plans relating to training for new procedures and interfaces to existing manual and computer systems; and the design and implementation of standard parts libraries and product information data bases. The centre has a very wide range of equipment and software for CAD/CAM applications.

ONTARIO CENTRE FOR ADVANCED MANUFACTURING (OCAM)

400 Collier-McMillan Drive
Cambridge, Ontario
N1R 7H7

Telephone: (514) 622-3100

Chief Executive Officer: K. H. Jones,
President

Senior Marketing Executive: G. D. Robertson,
Vice-President

Activities: OCAM delivers services to industry through its three Ontario Centres: Ontario CAD/CAM Centre, Cambridge; Ontario Robotics Centre, Peterborough; Canada-Ontario Centre for Advanced Manufacturing, Windsor. (See the corresponding sections for information on these centres.) OCAM aims to improve the productivity and competitive ability of Ontario industry and commerce by instituting programs that promote public awareness and applications of CAD/CAM and robotics and that encourage the growth of Ontario industries supportive of CAD/CAM and robotics.

**ONTARIO CENTRE FOR AUTOMOTIVE PARTS
TECHNOLOGY (OCAPT)**

63 Church Street
St Catharines, Ontario
L2R 3C4

Telephone: (416) 688-2600

Chief Executive Officer: G. Lacy, President

Senior Marketing Executive: J. Kelman,
Director, Marketing and Information

Senior Consultants:

P. Halkes, Director, Manufacturing
Services
G. Howard, Director, Technology
Development

Activities: OCAPT was formed to help Ontario-based automotive parts manufacturers in three main areas: to improve manufacturing productivity and quality; to enhance product and process technical capability; and to identify and capture new market opportunities. The resources of other centres are channelled through OCAPT to supply information and skills to auto parts producers. It provides funding assistance, consulting services, technical personnel support and seminars on a range of manufacturing technology and marketing subjects.

ONTARIO ROBOTICS CENTRE

743 Monaghan Road
Peterborough, Ontario
K9J 5K2

Telephone: (705) 876-1611

Chief Executive Officer: K. Jopes, President

Senior Consultants:

I. Barrie, Vice-President
M. Patrick, Manager, Applications
Services

H. Lowe, Manager, Technical Services
T. Spooore, Manager, Client Services
B. Durant, Manager, Education Services

Size: 27 employees

Activities: The centre has helped develop advanced manufacturing engineering systems in about 30 companies across Ontario. It has completed contracts in the automotive, boating, footwear, electronics and other industries. It also conducts applications research, specializing in the area of manufacturing engineering, as well as seminars. Robot facilities include the Unimate 2750, American Merlin, Matonair M/35, Schrader Bellows Motion-Mate and others. The centre's computer simulation packages are PLACE, SEE-WHY, and Simon, and its vision systems include Automat and a Bateman processor. A major software accomplishment of the centre is a conceptual solution for the automated inspection of automotive instrument panels, including a vision system, tactile sensors and a robot.

ORCATECH INC

1000 Morrison Drive
Ottawa, Ontario
K2H 8K7

Telephone: (613) 726-1600

Telex: 053-3868

Chief Executive Officer: Ian F. Carlisle,
President

Senior Marketing Executive: Malcolm R. Cocks

Senior Engineering Executive: Carol Lane

Branch Offices: Toronto, Montréal

Size: 28 employees; annual sales between
\$2 million and \$20 million

Activities: Oratech represents suppliers of software used in universal NC machine tooling, NC consulting language, APT tutorial and training, and interactive post-processor generators. It also provides complete turnkey CAD workstations for mechanical drafting, general layout, electrical schematic capture and PCB design. The software it distributes derives from ICAM, Documented Circuits and Prior Data Sciences, among others.

PAVESI INTERNATIONAL

5325 Fairview Street
Burlington, Ontario
L7L 5K4

Telephone: (416) 639-5005

Telex: 06-18228

Telefax: 416-639-5944

Chief Executive Officer: Gary Smith,
President

Branch Office: Montréal

Size: 50 employees; annual sales between \$2 million and \$20 million

Activities: Incorporated in 1980, Pavesi designs and builds complete turnkey automated and material handling systems. Robotic systems are designed and equipped with Fanuc (General Motors) and Seiko robots. Pavesi's customers are the automotive, electrical and electronics, fittings, toy and appliance industries.

PC CANADA SYSTEMS INC

265 Nantucket Boulevard
Scarborough, Ontario
M1P 2P2

Telephone: (416) 751-3221

Chief Executive Officer: Douglas Peel,
President

Size: 15 employees; annual sales between \$2 million and \$20 million

Activities: The company acts as a consultant, designs and installs entire production-line systems, and sells CAD/CAM products. It distributes software, including AutoCAD, CAD/CAMERA, COMAC, Houston Instruments, DATA COPY, and INMASS/INOME, and supplies microcomputer-based CADD with AutoCAD software and IBM hardware. End uses for its software include PCB layout, nuclear valve process controls and food processing equipment. Research and development activities are an adjunct to the operation.

PC DESIGN SYSTEMS

901A - 1235 Bay Street
Toronto, Ontario
M5R 3K7

Telephone: (416) 923-9994

Chief Executive Officer: Herb Abrams,
President

Branch Office: 103 - 301 Moodie Drive
Nepean, Ontario
K2H 9C4

Size: 10 employees

Activities: A supplier of other manufacturers' products, systems, and turnkey micro CAD/CAM/CAE, PC Design sells the following: in software -- Cublcomp, Ultrath, Chancellor, Rosal, MegaCAD, IBM (VAD) and AutoCAD; in hardware -- Calcomp, Hewlett Packard, Hitachi, Microvitec, Nicolet and others. The end uses for these products include numerical control, printed circuit board design, two-dimensional and computer-aided design/drafting, three-dimensional solid model architectural/industrial design for audio-visual, and

three-dimensional wireframe for industrial design and survey efforts. It also supplies monitors, graphics cards, digitizers, plotters and printers.

PELTON ENGINEERING LIMITED

3991 Smuggler's Cove Road
Victoria, British Columbia
V8N 4M1

Telephone: (604) 477-8126

Chief Executive Officer: Thomas E. Pelton,
President

Size: five employees; annual sales between
\$50 000 and \$250 000

Activities: This consulting engineering firm develops and supplies ECAD software packages for use in computer drafting systems using IBM PC equipment. ECAD applications include structural, mechanical, electrical and civil engineering design activities.

PERRY DARK CONSULTANTS LTD

525 Seymour Street, Suite 109
Vancouver, British Columbia
V6B 3H9

Telephone: (604) 687-7675

Chief Executive Officer: D. A. Dark,
President

Size: five employees; annual sales between
\$50 000 and \$250 000

Activities: This consulting firm advises on a range of CAD/CAM processes. Its counselling and CAM systems evaluation services relate to machine tooling, programming and training systems, and the fundamentals of numerical control. Its CAD evaluation services are substantial: the preparation of

feasibility studies; analyses of CAD hardware/accessories/programs; benchmark testing; the co-ordination of procurement and implementation systems; CAD workshops and courses for client and staff instruction; and custom design of software.

P. L. DOUGLAS CONSULTANTS LTD

36 Lakeland Point Drive
Kingston, Ontario
K7M 4E7

Telephone: (613) 389-9613 or 547-6612

Chief Executive Officer: P. L. Douglas,
President

Size: Annual sales up to \$50 000

Activities: A research company and consultant to chemical and petrochemical enterprises, P. L. Douglas provides computer-aided process design and simulation together with applicable software. Hardware is not a part of the business at present. One of the company's objectives is the enhancement of process flowsheets.

PRIME COMPUTER OF CANADA LIMITED

5945 Airport Road
Mississauga, Ontario
L4V 1R9

Telephone: (416) 678-7331

Telex: 06-968967

Chief Executive Officer: Cal Haverstock,
President

Senior Marketing Executive: Martin Smith,
Director of Sales

Senior Engineering Executive: Annie Marks,
Customer Service

Branch Offices: Vancouver, Edmonton, Saint John, Halifax

Size: 180 employees; annual sales of more than \$20 million

Activities: A subsidiary of Prime Computer Inc of Natick, Massachusetts, this company is a major supplier of graphic numerical control software, including a part programming system using interactive graphics for 2D and 2½D components. Prime's MEDUSA AEC is its two- and three-dimensional design and documentation system for architectural and engineering projects. MEDUSA interfaces with FEMGEN and PDA/PATRAN-G for finite element modelling and analysis, and with GNC, COMPACT II and APT for numerical control uses. Many third-party software packages run on Prime systems, permitting MEDUSA integration with external systems for computer-aided engineering. Prime also supplies Tektronix and Calcomp plotters.

QUEBEC APPAREL PRODUCTIVITY CENTRE

555 Chabanel West
Montréal, Quebec
H2N 2H8

Telephone: (514) 384-9760
Telex: 25134

Chief Executive Officer: Marc Lamontagne,
Executive Director

Senior Marketing Executive: Steve Spiegel,
Technical Director

Senior Consultants:
Karin Marks, Training
Gilbert Drouin, Information Officer

Activities: Created in 1983 to promote technology in the apparel industry, the centre provides consulting services on autodiagnosis, industrial and

management information and seminars, product selection criteria, computerized marking and grading, materials handling and state-of-the-art sewing machines. It also analyses CAD/CAM and robotics systems applications.

RMT ENGINEERING LTD

1155 Appleby Line, Unit D8
Burlington, Ontario
L7L 5H9

Telephone: (416) 336-7770

Chief Executive Officer: D. M. Pickard,
President

Senior Engineering Executive:
David Wilmshurst, Vice-President

Size: eight employees; annual sales between \$2 million and \$20 million

Activities: RMT is a robotics system house, specializing in casting cleanup, sealant and conveyor tracking applications, robot vision and installation of complete turnkey systems. End users include, for example, the automotive industry.

ROBOTIC SYSTEMS INTERNATIONAL LIMITED

9865 West Saanich Road
Sidney, British Columbia
V8L 3S1

Telephone: (604) 656-0101

Chief Executive Officer: Jack Wilson,
President

Senior CAD/CAM Contact: Douglas MacDonald

Size: 35 employees; annual sales of \$1.5 million

Activities: Robotic Systems specializes in various types of remote-control manipulators, and conducts research programs on the voice control of robots and other remote systems. Its main focus is the man-machine interface, and in the past, efforts in this area were directed towards sub-sea operations. Now the company is working on remote manipulators for use in the operation and maintenance of power distribution networks, as well as on a contract with the U.S. Navy for the design of automated torpedo refuelling systems, and on new non-destructive testing applications.

SERVO-ROBOT INC

1380 Graham Bell Street
Boucherville, Quebec
J4B 6A1

Telephone: (514) 655-4223 or 641-3476
Telex: 05-267624

Chief Executive Officer: Jean-Paul Boillot,
President

Size: 15 employees; annual sales between
\$250 000 and \$2 million

Activities: Servo-Robot is a Montréal-based company that develops, manufactures and supplies flexible manufacturing workcells for arc welding. Research and development work represents a large portion of its activities. The company is currently performing NRC-sponsored research to develop an intelligent vision system for robots.

Its main research activities in the past have led to the development of SERVO-ARC, a seam-tracking system for pulsed-MIG welding applications; SATURN, an integrated vision system for arc-welding robots; and MARS, an intelligent controller and programming system for welding robots.

The company's market consists of Canadian manufacturers, as well as those in the U.S., Japan and Europe, that are in fields involving welding operations. Servo-Robot specializes in turnkey systems using arc welding robots made by Cloos, a German corporation from which it has exclusive Canadian distribution rights.

SERVO TECHNOLOGY INC

1929 Provincial Road
Windsor, Ontario
N9A 6J3

Telephone: (519) 966-3662

Chief Executive Officer: David Muir, General
Manager

Size: nine employees; annual sales between
\$250 000 and \$2 million

Activities: Servo supplies servo hydraulic system design and electronic interfacing services, conducts research and development and provides consulting services.

SILICON GRAPHICS CANADA INC

357 Bay Street, Suite 803
Toronto, Ontario
M5H 2T7

Telephone: (416) 863-9355

Chief Executive Officer: Ed McCracken

Senior Marketing Executives:

D. McKinney
R. Mele

Senior Engineering Executive: H. Smith,
Vice-President

Size: five employees; annual sales between
\$2 million and \$20 million

Activities: A subsidiary of Silicon Graphics Inc of Mountain View, California, Silicon Graphics Canada supplies the IRIS integrated Raster imaging system workstation for interactive computer graphics applications. Well-suited to complex engineering and scientific end uses, the IRIS hardware consists of three, principal, pipelined components: the central processor, the Geometry Engine subsystem and the Raster subsystem. Specific fields for end use of the IRIS include the automotive and aerospace industries, scientific research, medical imaging, schematic design and VLS/layout, engineering and visual simulation, animation and graphic arts, text and documentation.

SOQUELEC TELECOMMUNICATIONS LTD

5757 Cavendish Boulevard, Suite 101
Montréal, Québec
H4W 2W8

Telephone: (514) 482-6427

Telex: 055-66136

Chief Executive Officer: Yvette Slakmon

Senior Marketing Executive: Pierre Tournay

Senior Engineering Executive:
Jean-Pierre Slakmon

Branch Office: Ottawa

Size: six employees; annual sales between \$2 million and \$20 million

Activities: Soquelec markets the products of about 15 manufacturers, emphasizing computer-aided electronics and design systems. Some of the companies it represents include Adams Russell, Logimetrics, Mast Microwave, Sawtek and Toshiba. The products it supplies include connectorized boxes, microwave components and assemblies, touchstone software, autolock sources, bipolar

power transistors, temperature compensated and sine wave oscillators and many others.

SPERRY INC COMPUTER SYSTEMS

55 City Centre Drive
Mississauga, Ontario
L5B 1M4

Telephone: (416) 270-3030

Senior CAD/CAM Consultant: R. W. Hopper

Branch Offices: Vancouver, Calgary, Edmonton, Winnipeg, Burlington, Toronto, Ottawa, Montréal, Québec, Fredericton, Halifax, St. John's

Branch Plants: Winnipeg; Dorval (Que.)

Size: 2200 employees; annual sales of more than \$20 million

Activities: A subsidiary of Sperry Corp of New York City, New York, Sperry Computer Systems offers CIM software and equipment that interacts with other available systems and manufacturing software. Its CIM processes include the Sperry Mapper, for conveying instructions and information; the Sperry/ME, for communicating with high-performance engineering workstations; the Sperry MBS, for integrated manufacturing and multi-level password security; the Sperry PCS, for monitoring work in process; and the Sperry DCS, for integrating data during all steps in the production control process.

STANDARD MODERN TECHNOLOGIES

69 Montcalm Avenue
Toronto, Ontario
M6E 4N9

Telephone: (416) 787-2494

Telex: 06-969781

Chief Executive Officer: A. G. Brown,
President

Senior Marketing Executive: P. Pratt

Senior Engineering Executive: W. R. Heathe

Size: 120 employees; annual sales between
\$2 million and \$20 million

Activities: Standard Modern is a subsidiary
of Baxter Technologies Corp of Toronto.
It designs and manufactures CNC turning
and CNC special systems. Its
operations focus on computer-aided
manufacturing needs, including
robotics, and research and development
activities in CAM.

SYNERCOM TECHNOLOGY INC

5 - 151 Carlingview Drive
Rexdale, Ontario
M9W 5S4

Telephone: (416) 674-0369

Telex: 06-989100

Chief Executive Officer: S. Brooke Patton,
Canadian Manager

Size: annual sales between \$2 million and
\$20 million

Activities: Synercom manufactures, designs
and sells products and services on its
own behalf, and maintains a
co-operative marketing agreement with
Digital Equipment of Canada. Its
products include INFORMAP II and
application software, for use in
geo-referenced data bases; and mapping
information management systems for
municipal gas, telephone and electrical
utilities.

SYS-TECH

319 - 140 Sainte-Catherine Street West
Montréal, Quebec
H3G 1R8

Telephone: (514) 879-9037

Chief Executive Officer:
Mario M. A. D'Avirro, President

Activities: SYS-TECH is a consulting firm
which provides a range of management
and technical expertise in CAD/CAM
applications, with emphasis on
engineering and manufacturing. Its
specializations include analysis of
requirements for CAD/CAM systems for
manufacturing; evaluation of turnkey
CAD/CAM systems; negotiation and
procurement of systems; installation of
CAD/CAM and computer systems; process
control system design and development.

SYSTEMHOUSE GRAPHICS

2827 Riverside Drive
Ottawa, Ontario
K1V 0C4

Telephone: (613) 526-0670

Telex: 053-4517

Senior Marketing Executive: Bruce Johnston,
Vice-President

Branch Office: 146 Front Street, 7th Floor
Toronto, Ontario
M5J 1G5

Other Branch Offices: In the U.S.A. and
Australia

Size: 35 employees; annual sales between
\$2 million and \$20 million

Activities: A subsidiary of Kinburn
Technology of Ottawa, Systemhouse
Graphics supplies turnkey mapping and
general-purpose CAD systems for

architectural and engineering drawings, and telephone outside plant drawings. It also distributes equipment made by Holquin Incorporated.

TARGA ELECTRONICS SYSTEMS

3101B Hawthorne Road
Ottawa, Ontario
K1G 3H9

Telephone: (613) 731-9941
Telex: 053-3351

Chief Executive Officer: G. A. McLintock,
President

Size: 20 employees; annual sales between
\$2 million and \$20 million

Activities: Targa specializes in solid-state industrial data storage systems using rugged, removable, bubble-memory cartridge systems technology. Targa's SOLIDRIVE I, compatible with the IBM PC, Xt or Industrial IBM 5531, for example, is designed to meet tough industrial conditions. A variety of other Targa data storage systems and cartridges offer special compatibility and interface properties, capacities of up to 512 kilobytes per cartridge, speeds of up to 200 kb/s, and operating temperatures from 0° to 60°C.

TAURUS COMPUTER PRODUCTS INC

1755 Woodward Drive
Ottawa, Ontario
K2C 0P9

Telephone: (613) 226-5361

Chief Executive Officer: David Murray,
President

Senior Engineering Executive:
Philip Carrillo

Size: 17 employees; annual sales between
\$250 000 and \$2 million

Activities: Taurus carries out product testing for manufacturers in the automotive and appliance fields. Taurus services include the monitoring of manufacturing and operations efficiency in such fields as batch mixing, weaving, diesel power generation, and the manufacture of fibreglass paneling and paper plates.

TAYCOTRONICS INC

2570 Haines Road, Suite 8
Mississauga, Ontario
L4Y 4A3

Telephone: (416) 279-9550

Chief Executive Officer: W. T. Taylor,
President

Size: three employees; annual sales between
\$50 000 and \$250 000

Activities: Taycotronics supplies CAD equipment and networking systems, including AutoCAD software for desktop micros. It sells plotters, digitizers and peripheral devices manufactured by Houston Instruments, Amplot and Roland, Kurta, Micro Soft; and the touch pen made by Sun-Flex.

TEXAS INSTRUMENTS INCORPORATED

Digital Systems Division
280 Centre Street East
Richmond Hill, Ontario
L4C 1B1

Telephone: (416) 884-9181

Chief Executive Officer: Jim Boilin, General
Manager

Size: annual sales of more than \$20 million

Activities: This company manufactures professional computer equipment for sale in the AutoCAD market. It supplies a full range of computers that run on the AutoDesk program and that are designed for a drafting end use. Texas Instruments also provides printed circuit board testing systems.

THE ANSWER

1711 Welch Street
North Vancouver, British Columbia
V7P 3G9

Telephone: (604) 984-0211

Contact: Michael Guild, Marketing
Representative

Branch Offices: Vancouver, Edmonton, Calgary,
Toronto

Size: 100 employees; annual sales between
\$2 million and \$20 million

Activities: The company supplies microcomputer-based CAD systems and sells software and hardware produced by AutoCAD, Houston Instruments and Texas Instruments.

TRACAN ELECTRONICS CORP

1200 Aerowood Drive, Unit 4
Mississauga, Ontario
L4W 2S7

Telephone: (416) 621-4917

Chief Executive Officer: Valdu Loit,
President

Branch Offices: Ottawa, Montréal

Size: 16 employees; annual sales between
\$2 million and \$20 million

Activities: Tracan supplies controls for numerical control machinery and sells colour graphics systems.

TRISPIRE INDUSTRIES INC

1625 Sismet Road, Unit 9
Mississauga, Ontario
L4W 1Z6

Telephone: (416) 624-5353

Chief Executive Officer: Ian R. Simpson,
President

Size: five employees; annual sales between
\$250 000 and \$2 million

Activities: Trispire supplies Anilam Crusader Series-M three-axis microprocessor CNC controls to the machine tool industry. These controls are available on a variety of new machines, and as complete retrofit packages for knee mills. The company also supplies MiniCam CAD/CAM offline programming, with self-diagnostic circuitry for applications in machining, scheduling, payroll, accounting and inventory.

VADEKO INTERNATIONAL INC

6335 Millcreek Drive, Suite 62
Mississauga, Ontario
L5N 2M2

Telephone: (416) 821-3222
Telex: 065-28105

Chief Executive Officer: Graham Whitehead,
President

Size: 43 employees; annual sales between
\$2 million and \$20 million

Activities: Vadeko provides turnkey systems for material handling, assembly, electronic component placement and insertion tasks. It is equipped for the manufacture of end-of-arm tooling, interfacing, predelivery testing and integration. Other Vadeko activities include robot automation and remote system projects, commissioning of a nuclear maintenance system, and a multi-robot paint system for the rail car industry. Vadeko also represents Hitachi, providing a system application centre for its robot products. Its facilities include an applications workshop for feasibility evaluation of robot uses and program development; design engineering facilities for system analysis, software development, design and equipment selection utilizing CAD/CAM; and data bases.

VASILCA ENGINEERING INC

247 Carrier Drive, Unit 1A
Rexdale, Ontario
M9W 5Y8

Telephone: (416) 674-1231
Telex: 06-963548

Chief Executive Officer: G. Vasilca,
President

Size: four employees; annual sales between
\$50 000 and \$250 000

Activities: Vasilca's CAD/CAM expertise

involves control systems, their design and installation, as well as PLC Ladder diagram documentation. Vasilca is a consultant, providing the programming for logic controllers and the software for industrial control and computer monitoring. The company also supplies turnkey systems for chemical process control, using Allen-Bradley and Advisor equipment. Its automatic control system equipment also includes the Square D and the Modicon Programmable Logic Controller.

VENTURES II INC

54 Conover Street
Ottawa, Ontario
K2G 3Z5

Telephone: (613) 828-5657

Chief Executive Officer: G. Patterson, Senior
Partner

Size: four employees; annual sales between
\$50 000 and \$250 000

Activities: Ventures II provides management and engineering consulting services to corporations, government agencies and financial institutions. Its expertise lies in evaluation of requirements and the corporate and sociological implications of CAD/CAM and robotics technology. It provides overall systems project management, from design to installation, and has additional capabilities in printed circuit board systems design and manufacture, and in CAD/CAM systems training courses.

VERSATEC, A XEROX COMPANY

802 - 251 Consumers Road
Willowdale, Ontario
M2J 4T5

Telephone: (416) 494-8204

Chief Executive Officer: Gary Durno, General
Manager

Branch Offices: Calgary, Ottawa, Montréal

Size: 20 employees; annual sales between
\$2 million and \$20 million

Activities: Versatec, a subsidiary of Xerox
Canada Inc, Don Mills (Ont.), sells and
services its own line of plotters.

VERTIGO COMPUTER IMAGERY INC

1177 West 8th Avenue
Vancouver, British Columbia
V6H 1C5

Telephone: (604) 682-0966

Chief Executive Officer: Fred Daniels,
President

Senior Engineering Executive: Patrick Conroy,
Director

Branch Office: Vancouver

Size: 32 employees; annual sales between
\$250 000 and \$2 million

Activities: Vertigo designs and markets
computer graphics systems for industry,
and is active in the research and
development of new products and
systems.

WHITE STORAGE AND RETRIEVAL

190 Britannia Road East, Unit 24
Mississauga, Ontario
L4Z 1W6

Telephone: (416) 890-0001

Chief Executive Officer: Ed Stanevicius,
President

Senior Engineering Executive: Greg Amos

Branch Offices: Vancouver, Toronto, Montréal

Size: 10 employees; annual sales between
\$2 million and \$20 million

Activities: White Storage is a subsidiary of
the White Machine Company of
Kenilworth, New Jersey. Its CAD/CAM
services and products include drafting
and inventory control software, storage
and retrieval systems, and space-saving
storage units. The end uses of its
products are robot and conveyor
carousel systems, electronics
applications, product assembly staging,
pre-assembly kitting of small parts,
and three-dimensional-perspective
drawings generation for use in
proposals, production and assembly.

YORK INSTRUMENTS

70 - 1262 Don Mills Road
Don Mills, Ontario
M3B 2W7

Telephone: (416) 445-1255

Chief Executive Officer: S. A. Rybb, Manager

Senior Engineering Executive: E. C. Rivers

Size: four employees; annual sales between
\$250 000 and \$2 million

Activities: York supplies CNC milling
machines to educational institutions
for teaching applications, as
necessary. It is also a distributor
for Feedback Instruments Limited and
Terco A.B.

ASSOCIATIONS AND SOCIETIES



CAD/CAM ASSOCIATION CAO/FAO

P.O. Box 992
Desjardins Postal Station
Montréal, Quebec
H5B 1C1

Telephone: (514) 879-9037

Chief Executive Officer: Mario D'Avirro,
President

Activities: The association was formed in 1981 as a result of the need of CAD/CAM users to share their experiences with the new technology and to pursue common goals. Today, the association is composed of many individuals and corporations who are users or who are interested in the application of CAD/CAM. The association's objectives are to promote the awareness, application and implementation of CAD/CAM; to provide a forum discussion, education and the exchange of ideas; to act as an information centre; to sponsor meetings, seminars, expositions and publications; and to further the interests of its members common to other associations and government.

CAD/CAM TECHNOLOGY ADVANCEMENT COUNCIL

Office of Industrial Innovation (E011)
Department of Regional Industrial Expansion
235 Queen Street
5th Floor East
Ottawa, Ontario
K1A 0H5

Telephone: (613) 995-3741

Contact: Louis Giroux, Secretary

Activities: Established in 1978, the council is composed of representatives from industry, education, and the federal government. It provides advice to government on national needs and programs related to CAD/CAM and aims

to enhance the use and application of these technologies through dissemination of relevant technological information. It holds seminars and conferences, maintains international liaison and distributes various publications.

CANADIAN INSTITUTE OF STEEL CONSTRUCTION (CISC)

201 Consumers Road
Suite 300
Willowdale, Ontario
M2J 4G8

Telephone: (416) 491-4552
Telex: 06-986547

Chief Executive Officer: H. A. Krentz,
President

Activities: CISC's CAD/CAM emphasis is on the development of software programs for the HP9816 and IBM PC applicable to the design of steel building frames and their components. Its work also supports mainframe, programmable calculator and desktop computer programs.

CANADIAN PORTLAND CEMENT ASSOCIATION (CPCA)

116 Albert Street
Suite 609
Ottawa, Ontario
K1P 5G3

Telephone: (613) 236-9471

Contact: Richard J. McGrath, National
Structural Engineer

Activities: CPCA maintains a computer program library, which is composed of designs for the erection of concrete structures. All programs undergo annual revision to achieve conformity with ongoing changes in Canadian building codes and engineering

practices. CPCA acts in a supportive role, distributing software for concrete structural design and serving as a source of current information for users. It maintains a hot-line telephone listing.

**CANADIAN SHIPBUILDING AND SHIP REPAIRING
ASSOCIATION (CSSRA)**

801 - 100 Sparks Street
Ottawa, Ontario
K1P 5B7

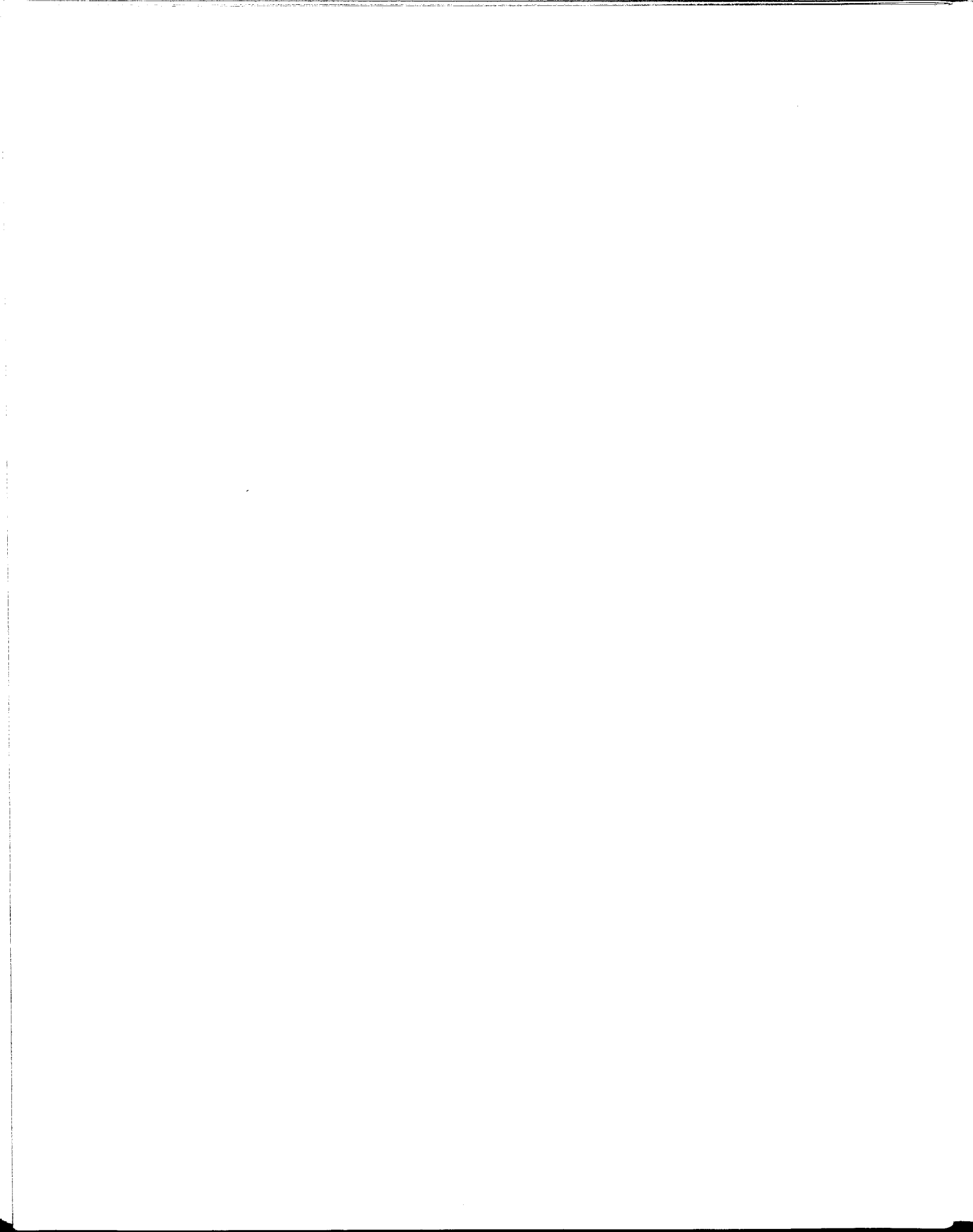
Telephone: (613) 232-7127

Telex: 053-4848

Chief Executive Officer: Henry M. Walsh,
President

Activities: The association supports the efforts of members to improve efficiency and encourages innovation in the automation of their procedures and equipment. It also promotes the introduction of CAD/CAM technology into its members' operations. The association distributes a CAD/CAM newsletter and submits CAD/CAM reviews to various publications.

RESEARCH ORGANIZATIONS



CANADIAN INSTITUTE OF METALWORKING (CIM)

1276 Sandhill Drive
P.O. Box 7317
Ancaster, Ontario
L9G 3N6

Telephone: (416) 648-5011

Chief Executive Officer: Alan C. Frosst,
C.D., Ph.D., President

Activities: CIM is a leading research organization, which provides CAD/CAM training and education programs, conducts feasibility and engineering development justification studies, and develops special-purpose software. It also provides a wide range of design, drafting, and manufacturing prototype services. CIM focuses its research and development on high-accuracy aerospace, manufacturing and transportation requirements and, in particular, on vehicle mold and die components and tooling.

CENTRE DE RECHERCHE INDUSTRIELLE DU QUÉBEC

245 Hymus Boulevard
P.O. Box 570
Pointe-Claire, Quebec
H9R 4S6

Telephone: (514) 694-3330

Telex: 05-822704

Chief Executive Officer:
Guy Bertrand, President and Director
General

Senior Marketing Executive: Jacques Plourde,
Commercial Director

Activities: The centre conducts research in applied science, modifies industrial and scientific procedures and products, and gathers and disseminates technological/industrial information. It has particular expertise in

mechanical simulation, two- and three-dimensional CAD, electronic and mechanical CAD, artificial vision, sensors and artificial intelligence. Robotics hardware includes Asea IRB L6/2, IRI, Microbot, Seiko and Armdroid.

CENTRE QUÉBÉCOIS POUR L'INFORMATISATION DE LA PRODUCTION

1600 Henri Bourassa Boulevard West
Room 408
Montréal, Quebec
H3M 3E2

Telephone: (514) 335-6116

Chief Executive Officer: Roland Dugré,
President and Chief Executive Officer

Senior Marketing Executive: Gaston Beaulieu,
Technical Director; André Saint-Onge,
Administrative Director

Activities: The centre has been established to further integration of the new CAD/CAM technologies and the progressive automation of production processes in Quebec's manufacturing sector, and to distribute and demonstrate CAD/CAM technologies. Its services include distribution of information on automation, software and equipment demonstrations, technical development and experimental testing, technical consulting for the industry, continuing education for technical staff, and automation plan developments. The centre also conducts research and development on the adaptation and development of process analysis methods and manufacturing equipment and the development, adaptation and testing of CAD/CAM systems and robotics.

INSTITUT DE RECHERCHE D'HYDRO-QUÉBEC (IREQ)

1800 Montée Sainte-Julie
Varenes, Québec
J0L 2P0

Telephone: (514) 652-8011
Telex: 05-267486

Chief Executive Officer: Toby Gilsig,
Vice-President, Research

Senior Marketing Executive: Gerard Juneau,
Marketing Manager

Activities: The Institute fulfills four functions: to solve Quebec Hydro's technical power production, conveyance and distribution problems; to develop new applications for electricity; to forecast the future technological needs of Quebec Hydro; and to study the possibilities of alternative energy sources for the production of electricity. The Institute combines equipment, including a Unimate PUMA 760 for general robotics, with expertise in drilling and welding, as they apply to turbine repair. Its research interests are in the development of equipment and systems for electrical line repair.

INSTITUT INFORMATIQUE DU QUÉBEC

Lionel-Groulx College
100 Duquet Street
Sainte-Thérèse, Quebec
J7E 3G6

Telephone: (514) 430-3120

Chief Executive Officer: Gilleks Pilon,
Director

Senior Consultant: Jean-Denis Asselin

Activities: The Institute's purpose is to teach, conduct research, provide technical aid and disseminate CAD/CAM information to industry. It serves as

a data source for robotics and automatic applications, particularly in the field of microsystems, and it is now developing a robot controller for industrial end use. The Institute's facilities consist of 13 CAD/CAM workstations with VAX 780's, PDP 11's, and 13 Applicon stations, as well as other equipment.

MANITOBA RESEARCH COUNCIL

Industrial Technology Centre - CAE Division
1329 Niakwa Road
Winnipeg, Manitoba
R2J 3T4

Telephone: (204) 945-6000

Chief Executive Officer: Erling Nyborg,
Director

Senior Consultants: Jacob Reichbart, Head,
CAE Division; Harris Liontas, Manager,
Computer Services; Noel Briones,
Software Applications Manager

Activities: The mandate of the Industrial Technology Centre is to provide a range of facilities, equipment and specialized technical services for local companies. Its services include process, component and machine design development; prototype fabrication and evaluation; failure analysis; mechanical testing; and plant layout. CAE assistance consists of industry training, evaluation of CAD/CAM systems and system design and development. The centre's facilities include DEC VAX 11/780 and Prime 750 computers; Calma colour and BW W/S-4; three-line printers; Andrews 123/125 Wire EDM CNC machine; and a Zonic data acquisition system.

NATIONAL RESEARCH COUNCIL CANADA

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

Telephone: (613) 993-0261

Telex: 053-4134

Chief Executive Officer: Dr J.Y. Wong,
Director

Senior Consultants: J. Brahan, Head,
Information Science; N. Burtnyk, Head,
Computer Graphics
J. Domey, Head, Electronics
Engineering

Activities: NRC's Division of Electrical Engineering conducts research and development in the area of advanced manufacturing technology, including development of software packages for sculptured surface design and rendering; specialized CIM information structure and data-base management systems for CAD/CAM; sensory-based robotics systems for applications in flexible assembly; general-purpose, three-fingered, intelligent grippers and the use of tactile sensors in such grippers; laser-based machine vision systems; advanced robotic workstations for task planning and simulation for sensory-based systems; techniques for real-time measurement and inspection; expert systems for use in design and production planning; and fibre optic and integrated optic sensors. The division's areas of technical expertise include computing architecture and real-time computing, computer graphics and person-machine interaction, artificial intelligence, image processing, signal processing (digital and optical), electro-optics and data base systems.

NATIONAL RESEARCH COUNCIL CANADA

Division of Mechanical Engineering
Montreal Road
Ottawa, Ontario
K1A 7X6

Telephone: (613) 993-2424

Telex: 053-3386

Chief Executive Officer: E. H. Dudgeon,
Director

Senior Consultants:

G. McGregor, General Manager,
Manufacturing Technology
P. Fammill, Head, Systems Laboratory

Activities: NRC's Division of Mechanical Engineering works in three CAD/CAM areas: It investigates promising technological applications for industry; conducts co-operative projects with industry to develop new technologies; and provides consulting assistance to industry on specific problems. Its research efforts include a cell, controller for an adaptive manufacturing cell epoxy and aluminum matrix fibre composites, robot sensor control, offline robot programming, and cutting and joining processes.

NATIONAL RESEARCH COUNCIL CANADA

INDUSTRIAL MATERIALS RESEARCH INSTITUTE
75 De Montagne Boulevard
Boucherville, Quebec
J4B 6Y4

Telephone: (514) 641-2280

Chief Executive Officer: George Bata,
Director

Activities: The missions of the Industrial Materials Research Institute are development of software and simulation systems for materials handling, integration of these systems into the

design and manufacture of products and tools, and promotion and dissemination of technology to Canadian industry. Its research efforts are restricted to unique equipment and expertise. The institute's equipment includes molding presses, welding machinery, extrusion and galvanization, plasma coding and a CNC machine tool centre.

NATIONAL RESEARCH COUNCIL CANADA

WESTERN LABORATORY
Division of Mechanical Engineering
3904 West 4th Avenue
Vancouver, British Columbia
V6R 1P5

Telephone: (604) 732-4475
Telex: 04-55141

Senior Executives in Research:

Dr Clive Dayson, Head
K. G. Whale, Associate Research
Officer

Activities: NRC's Western Laboratory conducts applied research in the areas of CAD/CAM, AI and CIM. Its software includes both in-house developed two- and three-dimensional wireframe CAD/CAM for microcomputers, and a McAuto Unigraphics CAD/CAM system. The computer facilities are varied: two DEC PDP 11/60's; HP Series 200, model 16; various microcomputers; and Enshu AccuMill, with a Fanuc 3M controller.

ONTARIO CENTRE FOR MICROELECTRONICS

1150 Morrison Drive
Ottawa, Ontario
K2H 9B8

Telephone: (613) 596-6690

Chief Executive Officer: Lionel Hurtubise,
President

Senior Marketing Executive: R. D. Copeland,
Director, Business Development

Senior Consultants: Karl Mayer,
Vice-President, Engineering
Karl Siemens, Manager, IC Design
Sandy Farrell, Manager, Product Design

Size: 40 employees; a 1250-square-metre
facility

Activities: The centre encourages the use of advanced microelectronic technology in new product design, and conducts feasibility studies to determine the cost-effectiveness of technology options in relation to production volume. It has special expertise in the development of cost-effective robots using VLSI techniques. The centre's computer facilities consist of a DEC VAX 780, 15 CAD workstations, an IC prober and complete H microprocessor emulator capability.

ONTARIO RESEARCH FOUNDATION

Sheridan Park
Mississauga, Ontario
L5K 1B3

Telephone: (416) 822-4111
Telex: 06-982311

Chief Executive Officer: Paul Midg,
President

Senior Marketing Executive: Jim Johnston,
Vice-President

Senior Consultants: Robert Waller, Director,
Engineering Science
Dr Gordon Mutch, Manager, CAE

Activities: The Foundation provides consultation in the computer-based technologies, specifically in computer-aided engineering. Its expertise includes experimental modal (single and multipoint excitation) and

fatigue analysis using SDRC modal-plus on an eight-channel Genrad 2515. Services of the CAE group focus on the advanced analysis of design concepts as they relate to systems analysis.

QUEBEC MINISTRY OF ENERGY AND RESOURCES

Cartography Service
1995 Charest Boulevard West
Sainte-Foy, Quebec
G1N 4H9

Telephone: (418) 643-7666

Chief Executive Officer:
Claude de Saint-Riquier, Director

Senior Marketing Executive: Michel Bourassa

Senior Consultant: Dominique Bruger, Chief,
Programs and Special Projects

Size: 60 employees; a 3150-square-metre facility

Activities: The Cartography Service focuses on the use of geographic information taken from aerial photographs or satellite images for the production of topographical maps and small-scale resource maps. The service also promotes aerospace teledetection equipment. Its image systems are Intergraph and Dipix, running on PDP 11/70, PDP 11/40 and PDP 11/73 computers.

**SOCIÉTÉ DE MICROÉLECTRONIQUE INDUSTRIELLE DE
SHERBROOKE INC
(SMIS)**

Université de Sherbrooke
2500 University Boulevard
Sherbrooke, Quebec
J1K 2R1

Telephone: (819) 821-7620

Chief Executive Officer: Adrien Leroux,
President

Senior Marketing Executive: Denis Marchand,
CAD Director

Activities: Created in 1982, the Society has a mandate to help industry integrate microelectronics into products and processes; carry out research and development of electronic systems, circuits and components; and provide assistance in the application of printed circuits and mechanics. Its major facilities include CADD5-4X and CADD5-2 software, for such applications as printed circuit design and NC, operating on a CDS 4001 Computervision installation; two IBM PCs; a CGP-200X graphic processor; and more.

**SOCIÉTÉ D'INFORMATION ET DE RECHERCHE POUR
L'INDUSTRIE DE LA CONSTRUCTION (SIRICON)**

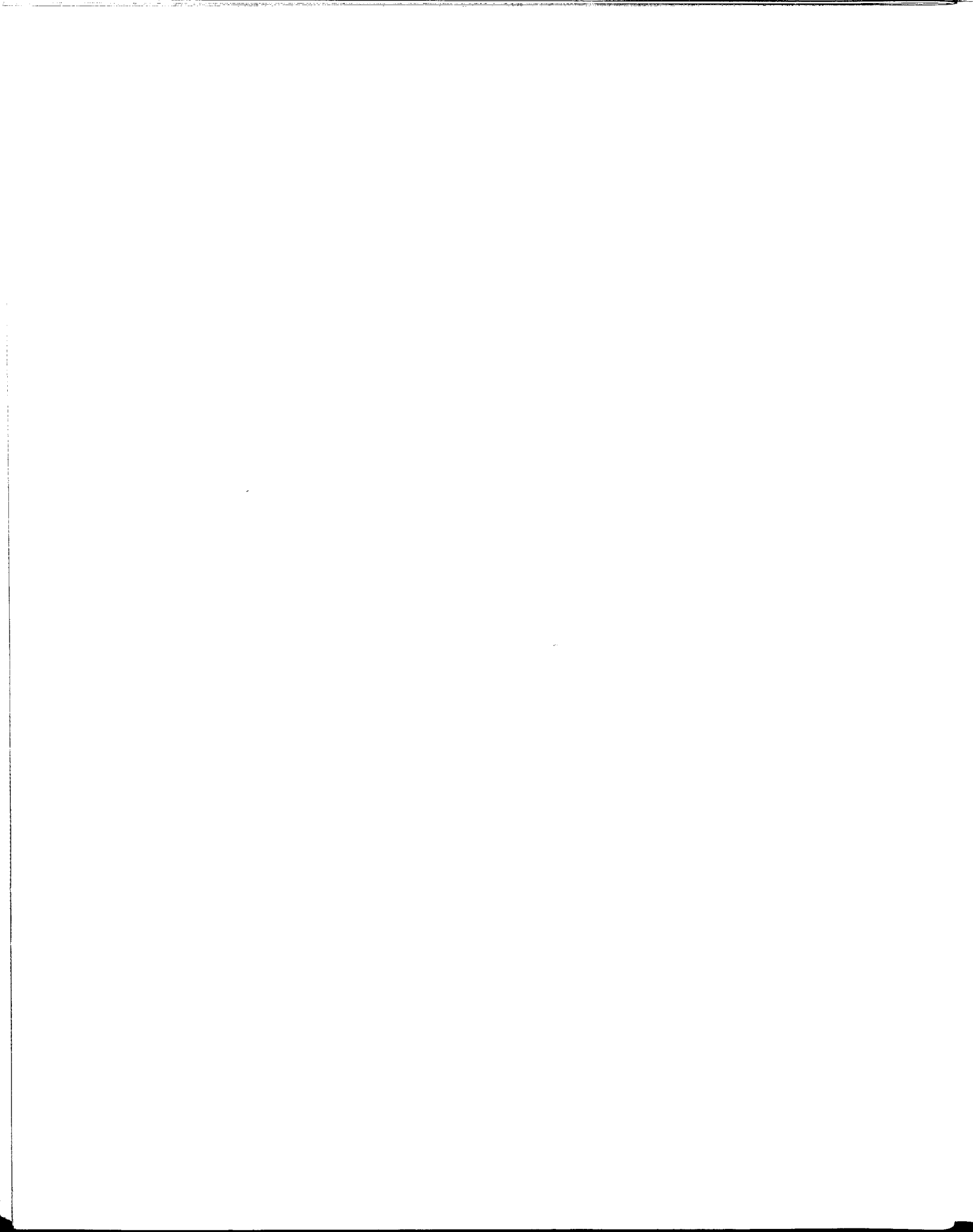
1455 De Maisonneuve
Montréal, Quebec
H3G 1M8

Chief Executive Officer: Paul Fazio,
Director

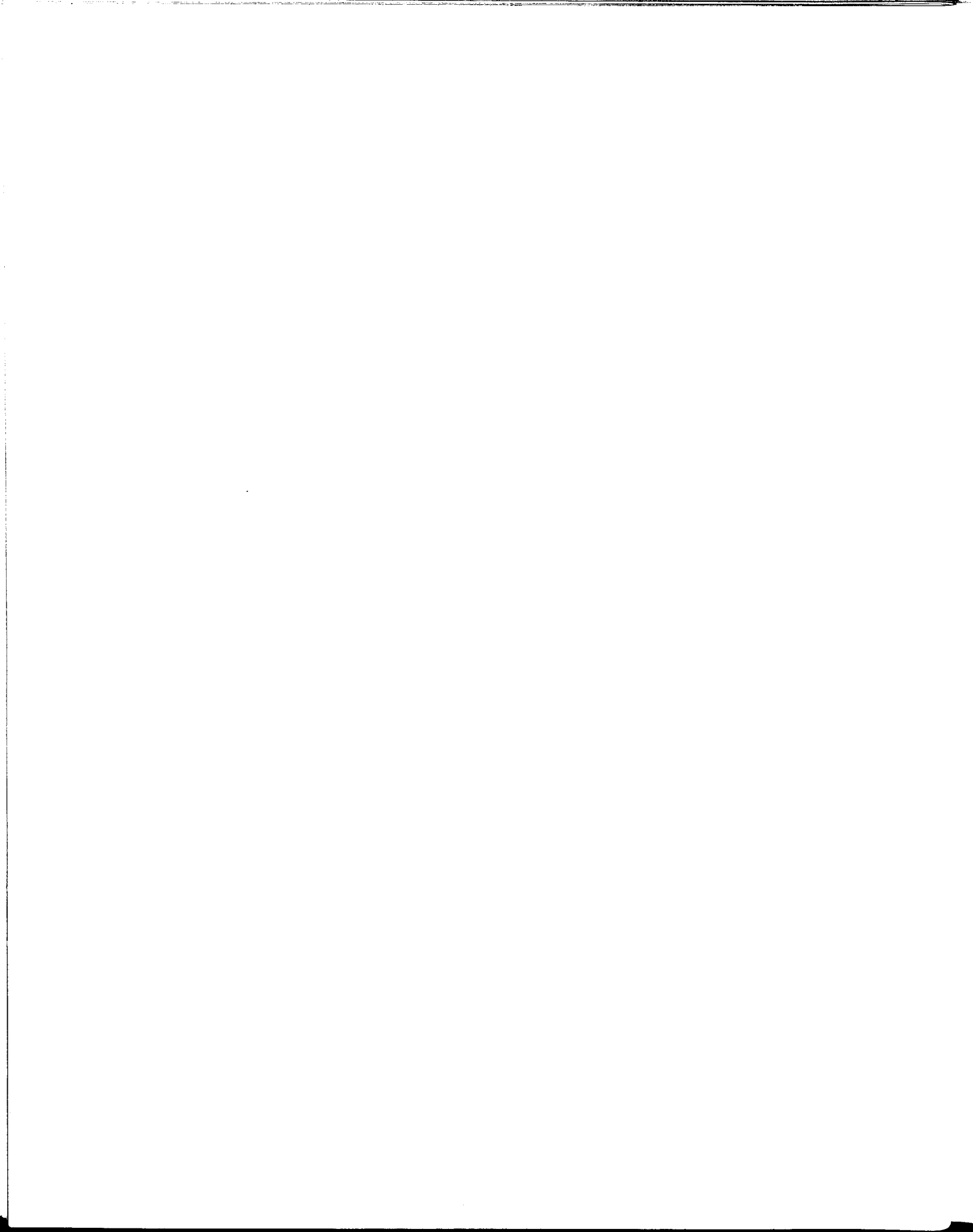
Senior Consultant: Pierre Guite, Assistant
Director

Size: 15 employees

Activities: Established in 1985, the Society develops and commercializes technological innovations of value to the construction industry, architects and engineers. It also disseminates information on relevant technology and carries out research and development on new construction systems.



EDUCATIONAL INSTITUTIONS



ALGONQUIN COLLEGE

Manufacturing Technology Laboratory
200 Lees Avenue
Ottawa, Ontario
K1S 0C5

Telephone: (613) 598-3303

Senior Consultant: Clifford N. Tite,
Co-ordinator, CAD/CAM

Activities: Algonquin's Manufacturing Technology Laboratory is a training centre which also conducts research in sensors, person/machine interface, gripper and wrist design, and CAD/CAM applications. As well, it provides training in robotics and the application of robotics to assembly operations in light manufacturing.

APPLIED MICROELECTRONICS INSTITUTE

1127 Barrington Street
Halifax, Nova Scotia
B3H 2P8

Telephone: (902) 421-1250

Telex: 019-22870

Chief Executive Officer: Douglas Pincock,
Director

Senior Engineering Executive: Logan Duffield,
Manager, Industrial Projects

Activities: Since its 1982 inception, the Institute has focused on microelectronic technology, research in low-power integrated circuit design, parallel processing and design-aid development. Its software systems consist of scicards and schematic programs. The Institute directs its CAD/CAM expertise toward the layout and design of printed circuit boards, simulations, integrated circuit design, photoplotters and NC drill and test equipment interfaces.

BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY

CAD/CAM Centre
3700 Wellington Avenue
Burnaby, British Columbia
V5G 3H2

Telephone: (604) 432-8488

Chief Executive Officer: A. P. Adamo, Program
Head, CAD/CAM

Senior Marketing Executive: W. Hepple,
Director, Purchasing

Activities: The Institute trains CAD/CAM technologists, helps industry evaluate and acquire CAD/CAM, and performs research. It uses Intergraph and Cimco package systems in two-dimensional CAD and in mechanical applications.

CANADIAN MICROELECTRONICS CORPORATION (CMC)

Carruthers Hall
Queen's University
Room 207
Kingston, Ontario
K7L 3N6

Telephone: (613) 547-6947

Chief Executive Officer: Dr D. R. Colton,
President

Senior Consultants: Daniel J. Gale, Director,
VLSIIC
W. A. Thompson, Treasurer

Activities: CMC functions in the area of integrated circuits to improve the research capabilities of universities. It also operates and manages the National Design Network to support its efforts in IC design and fabrication and to serve as a hub for the exchange of technology among universities. It processes design data from universities, prepares engineering

constraints for university IC design, prepares design data for circuit manufacturing by Northern Telecom, and purchases design and test equipment for loan to universities. CMC is funded by a block grant from the Natural Sciences and Engineering Research Council, and charges no fees for services to organizations accepted for involvement with it.

CARLETON UNIVERSITY

Robotics and Control System Laboratory
Department of Mechanical and Aeronautical
Engineering
Ottawa, Ontario
K1S 5B6

Telephone: (613) 231-2634

Senior Consultants: J. Z. Sasiadek,
Professor, G. Kardos, Professor

Size: two employees

Activities: Carleton's robotics laboratory focuses its research on the development of sophisticated control systems, such as flexible manipulators with adaptive control of arms, and end-point control systems that allow stochastic control and pattern recognition. It specializes in self-turning and model-reference control systems. Its hardware includes Rhino robots, Hyperion microcomputers, EMCO NC machine, and hydraulic actuators, and its software consists of ADA and LATHE.

CARTOGRAPHIC INSTITUTE OF SHERBROOKE

Training Centre
2144 King Street West
Sherbrooke, Quebec
J1J 2G1

Telephone: (819) 565-4992

Chief Executive Officer: J. M. Zarzycki,
Director

Size: 35 employees

Activities: Established in 1985, the Institute is a forerunner of the planned National Cartographic Institute of Sherbrooke, due to open in 1988 with a staff of 400. Its function is to train future Institute personnel, and to establish a national, geographic data base. Its cartographic CAD systems include graphic conception IGDS 8.7 running on an interactive graphic system composed of a DEC VAX 11/780, two 300 mb disk drives and the usual peripherals, and supported by stereo digitizer interface and map feature coding software. Additional equipment includes an Atlas electronic Mk-1, based on a DEC LSI 11/73.

CEGEP DE JONQUIÈRE

Centre de production automatisée
2505 Saint-Hubert
Jonquière, Quebec
G7X 7W2

Telephone: (418) 547-2191

Chief Executive Officer: Jacques Harvey,
Director

Senior Marketing Executive: N. C. Bouchard,
Technical Director

Activities: Services offered to students and industry include CAD/CAM advice, research, procedural design and development. The centre's expertise relates, in particular, to the aluminum, wood and pulp and paper industries. The main objective of the Centre de production automatisé is the transfer of technological knowledge to manufacturers. It offers assistance in two- and three-dimensional wireframe, three-dimensional surfaces and solids,

mechanical, electrical and AEC CAD with in-house spline software, general robotics, NC/CNC/DNC, and mechanical analysis. Its software includes kinematic inversion of five- and six-axis robot manipulators, spline, and programs for optimal synthesis of linkages and CAM mechanics.

CEGEP DE LA POCATIÈRE

Centre spécialisé de technologie physique
140 4th Avenue
La Pocatière, Québec
GOR 1Z0

Telephone: (418) 856-1525

Chief Executive Officer: Fernand Landry,
Centre Director

Senior Consultants: Jean-Pierre Nerou,
Department Co-ordinator (teaching)
Michel-Loup Cottinet, Co-ordinator,
Implementation of Automatics and
Robotics

Activities: Services offered to students and Industry include technical training and consulting, the provision of technical information, the development of specialized equipment, process optimization and starting up of production equipment.

CEGEP DE LÉVIS-LAUZON

Centre spécialisé de robotique
205 Mgr Ignace Bourget
Lauzon, Québec
G6V 6Z9

Telephone: (418) 833-5110

Senior Contact: Claude Martin, Engineer

Activities: The objective of the Centre spécialisé de robotique is to promote excellence in the field of computer-aided manufacturing, and to

help Quebec-based industry improve productivity and make technological improvements. It also conducts applied research and provides technical assistance and information. Its specific areas of expertise include automation and sequential circuitry, industrial robots, 2D, 2 1/2D, 3D and APT systems, flexible cells and inventory control.

CENTENNIAL COLLEGE OF APPLIED ARTS AND TECHNOLOGY

CAD/CAM Facility
Technology
P.O. Box 631, Station A
Scarborough, Ontario
M1K 5E9

Telephone: (416) 439-7180

Chief Executive Officer: I. B. McCauley,
President

Senior Marketing Executive: G. Yaworsky, Dean
of Continuing Education

Senior Engineering Executive: M. Kende,
P.Eng., Dean, E&T Division
N. Eley, P.Eng., TIPT Division

Activities: Created in 1983, the CAD/CAM Facility services Centennial's technology education programs. It consists of CAD/CAM laboratory, a machine shop, a CNC machine laboratory and robotics equipment. Specific services focus on the full and part-time training of groups and individuals to upgrade their CAD/CAM skills. The facility's two-dimensional CAD software includes HP Draft and EGS 200 running on nine HP 200 workstations networked through SRM. In mechanical CAM, Weber Prompt software is also run on HP 200 workstations, producing CNC programs for an OKK three-axis vertical machining centre with OKK Mate CNC controller, and an OKK four-axis

horizontal machining centre with Fanuc 6MB Level II CBC controller; a Baxter two-axis lathe with Fanuc 6TB CNC controller; and a Makino three-axis EDM with Makino CNC controller.

CENTRE FOR ADVANCED STUDIES IN COMPUTER AIDED DESIGN AND ENGINEERING

Carleton University
Colonel By Drive
Ottawa, Ontario
K1S 5B6

Telephone: (613) 231-3627

Telex: 053-4232

Chief Executive Officer: Neal Holtz,
Director

Senior Consultants: J. Goldak, Professor
J. Humar, Professor
E. Menipaz, Professor

Activities: The purpose of the Centre for Advanced Studies in Computer Aided Design and Engineering is to integrate and enhance world-class software for CIM, and to create a rich environment of software tools to improve programmer productivity. It is developing fully automatic finite element analysis to simulate manufacturing processes and facilities, and has capability in the computation of transient temperatures, strains/stresses in welds, and similar thermomechanical processes. Its hardware facilities are based on an Apollo network. Software programs used are PADL (solids modelling), IMP (kinematic, rigid body dynamics), ASGARD (nonlinear transient FEM), MOVIE BYU (graphics), PROLOG and LISP.

CONCORDIA UNIVERSITY

CENTRE FOR BUILDING STUDIES
1455 De Maisonneuve West
Montréal, Quebec
H3G 1M8

Contacts: Dr Paul Fazio, Director
Dr Ted Stathopoulos, Assistant
Director

Size: 30 employees, five involved in CAD/CAM activities on a full-time basis

Activities: The Centre for Building Studies, a university-based concern, was created in 1977 to provide academic programs in building engineering and in building studies, to undertake fundamental and applied research in the area of building, and to provide various laboratory facility services to industry and government. The professional backgrounds of the full-time staff include civil engineering, chemical and mechanical engineering, architecture, chemistry and physics. The centre's resources and expertise are available for research contracts only. Its areas of specialization include all aspects of building engineering, structural and energy analysis, life-cycle costing, and building facade generation. Its major software programs are Blast, Doe II, Simon, Megacurv, Suny, and Life. Research and development at the Centre focuses on non-linear, finite element analysis of concrete structures, and integrated building appraisal and design systems.

CONCORDIA UNIVERSITY

CENTRE FOR INDUSTRIAL CONTROL
SGW Campus, Annex B
1455 De Maisonneuve West
Montréal, Quebec
H3G 1M8

Telephone: (514) 879-8006

Senior Researcher: Dr R. M. H. Cheng,
Professor and Director

Activities: The Centre for Industrial Control conducts research and manages projects on automatic guided vehicles, camera vision, synchronization control of robots with conveyor systems, industrial robot calibration, electrohydraulics, servo systems, CAD, pneumatic control, and microprocessor applications for industrial control. Underwater robotics is another area of the centre's concern. Its focus of research is the development of low-cost, high-technology procedures to improve manufacturing productivity. The centre has developed software for a linear scanning camera to 3100 Bus Interface, operating software for a micro-eye camera to Northstar Advantage, a mathematical model analysis and control program, and more. Its hardware facilities include Unimate PUMA 560, PDP 11, Digital, Northstar Horizon, Northstar Advantage, IBM PC, Armdroid robot, and so on.

CONESTOGA COLLEGE OF APPLIED ARTS AND TECHNOLOGY

299 Doon Valley Drive
Kitchener, Ontario
N2G 4M4

Telephone: (519) 653-2511

Chief Executive Officer: K. E. Hunter,
President

Senior Consultants: D. Putt, Director
Doon Campus
J. Martin, Director, College Academic
Program and Development
A. Martinek, Associate Director
Doon Campus

Activities: The college functions as a support system for the school's engineering technician/technology programs, providing services to full-time and adult students. Its courses include Introduction to Solid Geometry Modelling in CAD/CAM, and a similar advanced course with electronic CAD added. The college uses Euclid and APT software for major project design courses and CNC machine tool programs. Other major facilities include a NC/CNC machine shop; a 10 graphic station CAD/CAM lab, based on DEC VAX 11/780 and Matra Datavision; Euclid solid modelling pen and electrostatic hard copy; and computer-controlled co-ordinate measurement.

DURHAM COLLEGE OF APPLIED ARTS AND TECHNOLOGY

CAD/CAM Centre
P.O. Box 385
Oshawa, Ontario
L1H 7L7

Telephone: (416) 576-0210

Chief Executive Officer: Mel Garland,
President

Senior Marketing Executive: J. L. Robinson,
Dean of Faculty

Senior Consultants: J. W. Davison, Director
of Technology
D. Helmer, Manager, CAD/CAM Centre
D. German, Electronic Consultant,
CAD/CAM Centre

Activities: Durham's CAD/CAM Centre provides academic training in CAD/CAM techniques to post-secondary students, apprentices and industry, using CV equipment. The subject areas include mechanical design, advanced surfacing, solid modelling, finite element analysis, civil applications, electronic circuit boards, plant layout design, NC applications and robotics. The Centre operates two computervision systems: one CV Designer V-4X and one CV CDS 4001.

ÉCOLE POLYTECHNIQUE

CAD Centre
P.O. Box 6079, Station A
Montréal, Quebec
H3C 3A7

Telephone: (514) 340-4639

Director: R. Camarero, Professor

Activities: The centre's role is to provide an environment for knowledge, research and the transfer of CAD technology. It offers intensive courses, using such software programs as CADAM, CATIA and CBDS. Its research expertise has led to development of a graphics station and software for hydraulic control computer-aided turbine design.

HUMBER COLLEGE

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

Telephone: (416) 675-3111

Chief Executive Officer: Angus King, Dean of Technology

Senior Consultant: Joseph A. Pustal,
Chairman, Mechanical/Industrial

Activities: Humber College provides a centre for post-secondary and industrial retraining in the programming and operation of advanced machining centres. Its main area of expertise is computer numerical programming and application and it conducts research in DNC development. The college provides specific services in programming and machining of one-off special purpose cams, and its facilities consist of Applicon and Auto-Trol colour terminals, CNC lathes and contour milling, Numeridex and VT100 Lumphar terminals, and plotters.

KELSEY/ATTC CAD/CAM CENTRE

Saskatchewan Department of Advanced Education
and Manpower
P.O. Box 1520
Saskatoon, Saskatchewan
S7K 3R5

Telephone: (306) 664-7184

Chief Executive Officer: Trevor Williams,
Head, CAD/CAM Program

Senior Marketing Executive: Thomas Stevens,
Executive Director, ATTC

Activities: Formed from a consortium of the Kelsey Institute, the Saskatchewan Research Corporation and the University of Regina, the centre provides engineering technological training, industrial retraining, and industrial and workplace support and training. Its facilities include a computer room, a 24-workstation CAD/CAM training lab, a 20-workstation Plato CAI lab, and a six-workstation micro and small systems CAD lab. Shared facilities include a machine and welding shop, a micro-computer lab with 36 IBM PCs, and engineering and drafting labs.

LAVAL UNIVERSITY

Groupe pour l'avancement de la productique
(GAP)

Sainte-Foy, Quebec
G1K 7P4

Telephone: (418) 656-2199

Contacts: Dr Dinh Nguen, Director, Mechanical
Engineering Department
Dr. Alain Martel, Professor,
Faculty of Administrative
Studies
Jean-Claude Brisson, Professor
Marc Richard, Professor (Mechanical
Engineering Department)
André Pomerleau, Professor
(Electrical Engineering
Department)
Denis Poussart, Professor
(Electrical Engineering
Department)
Minth Duc Bui, Professor (Computer
Science)

Activities: Besides conducting research and
teaching in the field of productivity,
GAP offers consulting services to
Quebec industry. Its main activities
include the design of automated
equipment, computer-aided design
research in vision, CAM, artificial
intelligence, operations management,
automation laser and robotics,
assistance in the implementation and
selection of industrial robots, joint
research projects with industrial
partners, and provision of special
courses for industry.

MCGILL UNIVERSITY

Computer Vision and Robotics Laboratory
Department of Electrical Engineering
3480 University Street
Montréal, Quebec
H4X 1Y4

Telephone: (514) 392-8097

Senior Consultants: Martin D. Levine,
Professor
Steven W. Zucker, Professor

Activities: The objective of the laboratory
is the research and development of
computervision and robotics. Its
primary facilities consist of two
robots, three VAXs, six cameras, an
optronics scanner, 32 terminals, and
Grinnell and Matrox vision systems.

MCGILL UNIVERSITY

Department of Mechanical Engineering
CAD and Robotics Group
817 Sherbrooke Street West
Montréal, Quebec
H3A 2K6

Telephone: (514) 392-5474

Telex: 5268510

Chief Executive Officer: M. P. Paidoussis,
Professor and Chairman

Activities: The group provides CAD and
robotics teaching, and conducts
research and development. Its
activities include trajectory planning,
spline software and kinematic/dynamic
control of robot manipulators of
arbitrary architecture in the presence
of singularities and redundancies, and
it has designed computer-controlled
multiple/kinematic/closed-loop robot
manipulators. It conducts FEM
applications for fracture analysis and
structural optimization and has applied
software for kinematic inversion of
five- and six-axis robot manipulators;
spline for solid modelling, geometric
evaluation and trajectory planning;
optimal synthesis of linkages and CAM
mechanisms; and the real-time control
of mechanical systems, including
flexible elements.

MCMASTER UNIVERSITY

Centre for Flexible Manufacturing Research and Development
Department of Mechanical Engineering
Hamilton, Ontario
L8S 4L7

Telephone: (416) 525-9140

Chief Executive Officer:

Dr Hoda A. Eimaraghy, Director

Activities: The centre's mandate is to conduct joint research and development projects with industry; to develop human resources; to provide a test-bed for prototype projects; to establish technology transfer mechanisms; and to complement the efforts of other government centres, especially those related to flexible manufacturing and robot assembly. Its services range from preparation of feasibility studies for implementing FMS to seminars and workshops, consultation, research contracts and joint university/industry research. The facilities available include an integrated flexible assembly system, two robots, material handling, computervision inspection and real-time system control. Other equipment consists of DEC VAX 11/730 and 780, graphics terminals and various software packages.

MCMASTER UNIVERSITY

Faculty of Engineering
1280 Main Street West
Hamilton, Ontario
L8S 4L7

Telephone: (416) 525-9140, ext. 4992

Telex: 061-8347

Senior Researchers: Dr D. Capson, Assistant Professor, Electrical Engineering
Dr H. A. Eimaraghy, Associate Professor, Mechanical Engineering

Dr D. Ghista, Professor, Biomedical Engineering
Dr R. Kital, Professor, Electrical Engineering
Prof. W. R. Newcombe, Mechanical Engineering
Dr N. Sinha, Professor, Electrical Engineering
Dr I. Yellowley, Associate Professor, Mechanical Engineering

Activities: The faculty's research interests focus on robot applications, their sensing, real-time adaptive control, assembly, processing and system integration. The thrust of its research is the development of practical robotic applications as a part of integrated systems, as for example, the use of robots in deburring, polishing, machine loading, kinematics and so on. The faculty is the developer of a binary vision system, software routines and algorithms for programming, modelling and retrofitting robots. Its facilities are extensive and include the PUMA 600 and Unimate 2000.

MOHAWK COLLEGE

Fennell Avenue West
Hamilton, Ontario
L8N 3T2

Telephone: (416) 575-1212

Telex: 0618348

Chief Executive Officer: K. McIntyre,
President

Senior Marketing Executive: J. Weber, Dean,
Marketing and Contract Services

Senior Consultants: H. Bastel, Dean, Faculty
of Technology
M. E. Hofstetter, Vice-President

Activities: Mohawk provides part-time and post-secondary education in applied arts and technology, along with

Industrial retraining and skill development. Its facilities include three campuses equipped with a range of CAD/CAM: programmable logic controllers (Modicon, Allen-Bradley); Hero, Armdroid, Atlas, Rhino and Tara robots; Interactive Computer Graphics; Calma (four stations); NC tape preparation (Fanuc PD); and CNC, Allen-Bradley series 8200.

NIAGARA COLLEGE OF APPLIED ARTS AND TECHNOLOGY

P.O. Box 1005
Welland, Ontario
L3C 1E2

Telephone: (416) 735-2211

Chief Executive Officer: Dr A. J. Knowles,
Dean, School of Applied Science and
Technology

Senior Consultants: G. Rowbottom, Chairman,
Manufacturing/Mechanical Construction
Division
G. Kovacs, Chairman, Resource Centre
for Skill Development
A. Backler, Chairman, Computer/
Chemical/Electrical/Electronics
Division

Activities: The College offers evening and day classes in CNC programming and fundamentals. Its software programs use Numeridex NICAM III, complete with backplotting. The major facilities vary according to campus: Those on Welland Campus include EMCO miniature CNC trainers, mills, and training lathes, together with Textronix colour graphics stations which provide printer, plotter and paper punch/reader capabilities. The Wellandvale Campus has an ELUX Wire EDM, an XLO k604 CNC mill and DEC PDP 11/23+ computers with similar Tektronix stations.

PACIFIC VOCATIONAL INSTITUTE

Applied Technology Training Centre
3650 Wellington Avenue
Burnaby, British Columbia
V5G 3H1

Telephone: (604) 434-5711

Chief Executive Officer: H. E. Justesen
President

Senior Consulting Services Executive:
G. Powers, Vice-President, Instruction

Activities: Opened in 1984, the Applied Technology Training Centre provides training in the following areas: industrial instrumentation and process control, CNC systems, numerical control machining, computer-aided drafting and automated materials handling. Other ATTC expertise includes avionics, computer-aided design and flexible manufacturing. The centre functions to develop, prepare and deliver programs in higher-level technical competencies, and to enhance the productivity of small business and the resource and manufacturing industries. Its facilities consist of a VAX 11/780 minicomputer, MORI SEIKI turning centre and Fanuc 6TB control, an OKK MCV 410 vertical machining centre with Meldas M2 control, and EMCO training lathes.

QUEEN'S UNIVERSITY

Department of Mechanical Engineering
Faculty of Applied Science
Kingston, Ontario
K7L 3N6

Telephone: (613) 547-6647

Chief Executive Officer: Dr C. N. Kerr, Head,
Department of Mechanical Engineering

Consultants: Dr W. B. Rice
Dr C. A. Mulvenna, Professor
Dr J. Jeswiet, Assistant
Professor
Dr T. N. Moore, Assistant
Professor
Professor A. Van Eyken,
Associate Professor and
Co-ordinator of the Engineering
Graphics Unit,
Department of Mechanical
Engineering

Activities: The Department of Mechanical
Engineering offers courses up to the
Ph.D. level in mechanical engineering,
including CAD/CAM and robotics.

QUEEN'S UNIVERSITY

Robotics Laboratory
Department of Electrical Engineering
Kingston, Ontario
K7L 3N6

Telephone: (613) 547-2878 and 547-6935
Telex: 0663244

Chief Executive Officer: Dr M. M. Bayoumi,
Professor

Activities: The objectives of Queen's
Robotics Laboratory include student
education in robotics; control of
Industrial robots using feedback
information from various sensors;
development of necessary hardware and
software to produce a multisensor,
multiprocessor industrial robot; and
novel control schemes for industrial
robots. Its research and development
efforts focus on obstacle avoidance,
object tracking and identification.
The laboratory's software programs
consist of communication routines to
interface the PDP 11/23 computer with a
Unimate PUMA 550 robot. Additional
facilities include an APPLE II-plus
computer and a Microbot teachmover
robot.

RED RIVER COMMUNITY COLLEGE

2055 Notre Dame Avenue
Winnipeg, Manitoba
R3H 0J9

Telephone: (204) 632-2211

Chief Executive Officer: G. Polonski,
Director

Senior Consultant: R. Dunham, Principal,
Industrial and Technical Division

Activities: The college provides technical
education through apprenticeship
programs, industrial liaison and
training, and CAD/CAM/CNC robotics
support. Its technical programs cover
mechanical, civil, computer,
instrumental and engineering
technology, and include machinist and
manufacturing training. The college's
software is CAM, for APT programming,
generic NC post-processing, and DNC
up/down load. Mass-11 word processing
and the Intergraph documentation
program are also used. The college's
computer/robot facilities include Terak
PDP 11/23-based workstations, Unimate
760 with VAL II control, American Robot
Merlin 6500 and Orcatech graphics
control stations on VAX 780 running
Euclid and others.

RYERSON POLYTECHNICAL INSTITUTE

CENTRE FOR ADVANCED TECHNOLOGY EDUCATION
350 Victoria Street
Toronto, Ontario
M5B 2K3

Telephone: (416) 979-5106

Chief Executive Officer: Dr C. D. Hall,
Managing Director

Senior Marketing Executive: Dr J. H. Hayne,
Program Director, Marketing

Senior Consultants: Professor P.J. Williams,
CIM Program Director
Dr S. A. Bector, Program Director,
Phototonics

Activities: The Centre for Advanced Technology Education provides state-of-the-art education to senior students and industry professionals in two emerging technologies: computer-integrated manufacturing and photonics. It also has a mandate to anticipate the innovations and applications likely to occur five years from now, in order to develop the appropriate course materials. The centre's services include seminars in CIM, CAD/CID and financial CIM, microcomputers as productivity tools, inventory management and MRP. Its permanent facility is equipped with networks, robotics, machine vision, assembly, labs and classrooms.

ST CLAIR COLLEGE OF APPLIED ARTS AND TECHNOLOGY

2000 Talbot Road West
Windsor, Ontario
N9A 6S4

Telephone: (519) 966-1656

Chief Executive Officer: B. McAusland,
President

Activities: St Clair College is an educational institution that specializes in the teaching of general electronic/electrical technology and the training of technicians in industrial control systems. It conducts no research. Its hardware includes VAX mainframes, a CAD laboratory and DC drive feedback equipment.

SASKATCHEWAN RESEARCH COUNCIL

CAD/CAM ROBOTICS CENTRE
30 Campus Drive
Saskatoon, Saskatchewan
S7N 0X1

Telephone: (306) 664-5413

Telex: 074-2484

Chief Executive Officer: James Hutch,
President, Saskatchewan Research
Council

Senior Consultant: Gordon Pierce, Manager,
Product/Process Development

Activities: The objective of the CAD/CAM Robotics Centre is the transfer of CAD/CAM technologies and expertise to local industry. Its services consist of in-plant placement of workstations connected to a CDC mainframe utilizing all major CAD/CAM application software, application support and product development support at the pre-prototype stage. Workstation placement and use is a subsidized service; other services are full-fee. It offers varying expertise in ICEM design drafting and solid modeler, ICEM schematics and Techout for electronics, manual cartography, ICEM NC machining (up to five-axis milling relating to engine lathes) and DRAM dynamic analysis. Robotics projects are also underway. Its facilities include a Cyber 830 computer, 20 Tektronix 4109, 4115, 4051 terminals, and Calcomp and Tektronix plotters. It also has an engineering data library. The centre's major software programs include Control Data's complete ICEM, FE and Dynamic analysis. The centre is affiliated with the University of Regina, the Machinery Institute, the Canadian Centre for Advanced Instrumentation, the Kelsey Institute and the Advanced Technology Training Centre, all in Saskatchewan.

SASKATCHEWAN TECHNICAL INSTITUTE

P.O. Box 1420
Moose Jaw, Saskatchewan
S6H 4R4

Telephone: (306) 693-8222

Chief Executive Officer: Dr Andy Nicol,
Principal

Senior Consultants: Robert Lindsay, Chairman,
Technology
Don Johnston, Head, Automation
Robotics
Brian Wood, Head, Engineering Drafting

Activities: The institute provides two-year courses of instruction in engineering technology to student undergraduates and to industry. Its areas of expertise centre on robotics and drafting engineering, incorporating CAD/CAM applications. The institute's facilities include PDP 11/70's, VAX 11/780's, IBM PCs, and HI DMP-42 and HP 7470A plotters.

SENECA COLLEGE OF APPLIED ARTS AND TECHNOLOGY

Manufacturing Laboratories
1750 Finch Avenue East
Toronto, Ontario
M2J 2X5

Telephone: (416) 491-5050

Telex: 06-966659

Chief Executive Officer: W. R. McCutcheon,
President

Senior Consultant: S. E. Quinlan,
Vice-President, Academic
C. R. Flacks, Dean, Technology
Division
D. E. Coates, Chairman,
Mechanical/Manufacturing Department

Activities: Seneca offers diploma courses in mechanical and manufacturing engineering technology as components of post-secondary curricula. It is active in adult education and skills growth in on-site industrial training, and offers various training programs directed towards engineering disciplines, drafting, fire protection, computers and electronics. Its software ranges from Auto-Trol series 5000 and 7000, to ANSYS finite element analysis, and COGO co-ordinate geometry for mapping and OPICT graphics. Major equipment includes VAX 11/780's, CNC million centres with a lathe, EMCO trainers, a Profilometer and more.

SHERIDAN COLLEGE

School of Applied Science and Technology
P.O. Box 7500
Brampton, Ontario
L6V 1G6

Telephone: (416) 459-7533

Chief Executive Officer: Walter Glaser, Dean

Senior Consultants: Elizabeth Bond, CAD,
Teaching Master
Thomas Logan, Director, Industrial
Training

Activities: Sheridan educates students in the use of CAD and NC, and focuses its facilities and services on the training of technicians in mechanical, electrical, chemical and civil engineering. Instruction includes machine tool and die and mold making, and the software programs in use consist of CEADS-CAD, APT, Euclid and COMPACT II. The College's hardware includes HP 1000, VAX 11/780 and MDSI. Sheridan also has such computer-to-production equipment interfacing as a vertical machining centre, an Excello with Bendix control, and a CNC slant-bed lathe with Robotics and CAD interfaces.

SIMON FRASER UNIVERSITY

Department of Computing Science
Burnaby, British Columbia
V5A 1A6

Telephone: (604) 291-4277

Senior Contact: Brian V. Funt, Associate
Professor

Activities: The primary research interest of the Department of Computing Science is computer vision, and includes automatic analysis of CT-scans of sawlogs for detection of defects. It aims to saw logs into lumber entirely under computer control. Other projects involve three-dimensional computer colour perception, and identification of specularities. Its equipment includes VAX 750's, SUN workstations, an International Imaging Systems Model 75 system, and IRIS graphics workstations.

SIR SANDFORD FLEMING COLLEGE

Centre for Integrated Manufacturing
Brealey Drive
Peterborough, Ontario
K9J 7B1

Telephone: (705) 743-5610

Chief Executive Officer: J. R. Arnold,
Chairman

Senior Marketing Executive:
S. A. M. Robertson, Vice-President,
Community Services

Activities: Since its inception in 1984, the Centre for Integrated Manufacturing has provided information support for local industry and training for students in various facets of computer-integrated manufacturing. It maintains post-secondary programs in materials management, industrial engineering,

CAD, and robotics, and trade training in programming set-up and in the operation of CNC, robotic, and CAD equipment. Its facilities include a six-station, three-dimensional Calma system; a 20-station, two-dimensional AutoCAD system; six horizontal/vertical turning and EDM CNC machines; a lab-based manufacturing information system, and laboratories for quality control, industrial engineering, parts programming and tape preparation. It works closely with the OCAM Robotics Centre in Peterborough, Ontario.

SOUTHERN ALBERTA INSTITUTE OF TECHNOLOGY

1301 - 16th Avenue N.W.
Calgary, Alberta
T2M 0L4

Telephone: (403) 284-8054

Senior Consultants: W. Baumbach, CAD
Co-ordinator
T. A. Fitzgerald, CAM Co-ordinator

Activities: Established in 1983, the Institute instructs post-secondary and adult students in CAD/CAM theory and practical applications. It specializes in Process, P and ID piping, and computervision hardware and software. Its CAD facilities consist of two 1M CPUs, two 300 mb disc drives, three Dot Matrix plotters and 14 workstations.

SOUTH WINNIPEG VOCATIONAL EDUCATION CENTRE

130 Henlow Bay
Winnipeg, Manitoba
R0G 0R0

Telephone: (204) 237-6917

Chief Executive Officer: E. A. Ramsay,
Director

Senior Consultant: Frank Zaboroski, Deputy
Director

Activities: This centre provides training in vocational and technical skills to secondary school and adult students. Its equipment includes CAD workstations, industrial and benchtop NC lathes, mills and robots. It offers courses and services in automatic systems and robotics, industrial design, drafting, electronics, mechanics and manufacturing.

TECHNICAL UNIVERSITY OF NOVA SCOTIA

Departmental of Industrial Engineering
P.O. Box 1000
Halifax, Nova Scotia
B3J 2X4

Telephone: (902) 429-8300

Telex: (TUNS) 019-21566

Senior Researcher: Andrew Kuslak, Assistant Professor

Activities: The research activities of the Department of Industrial Engineering focus on robotics and on systems related to vision, manufacturing and material handling. It is currently working towards the development of a high-level robot, a programming language and models. The robotics activities emphasize design and optimization of manufacturing and automated storage systems and of material handling systems.

UNIVERSITÉ DU QUÉBEC À MONTRÉAL

École de haute technologie
Département de la production automatique
180 Sainte-Catherine Street East
Montréal, Quebec
H2X 1K9

Telephone: (519) 397-3629

Chief Executive Officer: Joseph Bouchard, Director

Senior Consultants: Claude Oliver, Professor
Robert Sabourin, Professor

Activities: The university's École de haute technologie is a teaching faculty specializing in CAD/CAM. It has various equipment available, including two-dimensional and electronic CAD, using HP EGS 200 on HP 9836, and three-dimensional/mechanical CAD, using Anvil 400 on HP 9000. The robotics equipment is Microbot, Asea Model IRB 6, INTEL 380/86 and an in-house system for artificial vision research.

UNIVERSITY OF ALBERTA

Alberta Microelectronic Centre
Central Academic Building, Room 545
Edmonton, Alberta
T6G 2G1

Telephone: (403) 432-3914

Chief Executive Officer: Len Friedenbergh, General Manager

Senior Marketing Executive: Karl Miller, Manager of Marketing and Communication

Senior Engineering Executives: Grant Serink, Engineering Manager
Don Fulgham, Education Co-ordinator

Activities: Established in 1982, the Alberta Microelectronic Centre has a mandate to transfer microelectronics and CAD/CAM technology to industry. Its services include training, contract CAD services, and rental of CAD workstations (for a fixed fee or on an hourly basis). CAD operations utilize computer vision equipment, including the CADD5 4X and CDS 4000.

UNIVERSITY OF BRITISH COLUMBIA

Department of Electrical Engineering
2356 Main Mall
Vancouver, British Columbia
V6T 1W5

Telephone: (604) 228-5934

Senior Consultant: P. Lawrence, Associate
Professor

Activities: UBC's electrical engineering department began its robotics and teleoperations activities in 1983. Its specialties are subsea and forest industrial applications. The department's research objectives include improved human control in industrial manipulation systems, and the design of adaptive systems for manipulation control. Its current research focus is on human interface in teleoperation, image analysis and compression, adaptive control and learning processes. Its accomplishments include methods for digital processing of stereo images, and evaluation of human factors in subsea manipulation, using speech recognition and automated TV camera controls.

UNIVERSITY OF BRITISH COLUMBIA

Department of Mechanical Engineering
2324 Main Mall
Vancouver, British Columbia
V6T 1W5

Telephone: (604) 228-2781

Senior Consultants: D. Cherkas, Associate
Professor; F. Sassani, Assistant
Professor

Size: nine employees

Activities: The Department of Mechanical Engineering offers research, graduate and limited undergraduate teaching

programs. Its main areas of research are automatic control theory for end-point control, robot mobility, automatic programming of robots, and NC machine cell programming. Its areas of specialization include control theory, dynamics and automatic programming. The department's main objective is the addition of sensing and intelligence devices. Its accomplishments include the development of techniques for automatic programming and sonar range data processing for welding robots, guidance software for a mobile robot, and closed-loop end-point control algorithms.

UNIVERSITY OF BRITISH COLUMBIA

Laboratory for Computational Vision
Department of Computer Science
Vancouver, British Columbia
V6T 1W5

Telephone: (604) 228-3061

Chief Executive Officer: R. J. Woodham,
Director

Activities: The research mandate of the Laboratory for Computational Vision is to "make machines see". The main areas of research involve photometric methods for image analysis and representational adequacy for visual knowledge. The lab also conducts work in computational vision, forestry, oceanography, astronomy, geography, physics, electrical engineering, soil science and urban planning. Its specialties include knowledge representation, world modelling and pattern recognition. Although the lab's clientele is primarily UBC researchers, its facilities are also available to other universities and private industry. The main computer is a DEC VAX 11/780 with various peripherals including a high-resolution Optronics C-4500 colour film scanner-writer.

UNIVERSITY OF CALGARY

CAD/CAM Facility
Department of Mechanical Engineering
2500 University Drive
Calgary, Alberta
T2N 1N4

Telephone: (403) 284-5787

Chief Executive Officer: P. G. Glockner,
Department Head

Senior Consultants: D. Norrie, Professor of
Mechanical Engineering
R. Fauvel, Associate Professor of
Mechanical Engineering
A. Torvi, Associate Professor of
Mechanical Engineering

Activities: The CAD/CAM Facility provides
instruction, research and technical
services in CAD/CAM and associated
areas. It carries out research in
error analysis in multi-axis CNC
machining, CNC machine tool simulation
from G-codes, and the conversion of
engineering drawings to CAD
three-dimensional data bases.

UNIVERSITY OF MANITOBA

NSERC-CAE Laboratory
Department of Mechanical Engineering
Winnipeg, Manitoba
R3T 2N2

Telephone: (204) 474-9441

Telex: 07-587721

Chief Executive Officer: T. R. Hsu, Chairman,
Professor of Mechanical Engineering

Senior Consultants: J. Townsend, Business
Manager, Professor of Agricultural
Engineering
A. Shah, Treasurer, Professor of Civil
Engineering
R. B. Pinkney, Operations Manager,
Professor of Civil Engineering;

I. Goulter, Secretary, Assistant
Professor of Civil Engineering

Activities: The NSERC-CAE laboratory conducts
research and development in all aspects
of computer-aided design, interactive
computer, and graphics as they relate
to structural analysis and agricultural
applications.

UNIVERSITY OF MONTRÉAL

I.R.O. Department
Robotics and Computer Vision Laboratory
P.O. Box 6128
Montréal, Quebec
H3C 3J7

Telephone: (514) 343-7090

Department Director: N. F. Stewart,
Professor

Activities: The laboratory conducts research
in robotic control and vision,
including path planning in a cluttered
robotic workspace. It has special
expertise in automatic error recovery,
multiple robot control systems, methods
comparison for stereo vision, and
robotic simulation with automatic
collision detection. Its facilities
include a PUMA 560 robot, Hitachi
KP-120 CCD industrial cameras and
advanced workstations.

UNIVERSITY OF SASKATCHEWAN

College of Engineering
Saskatoon, Saskatchewan
S7N 0W0

Telephone: (306) 966-5379

Senior Researchers: R. Burton
M. Gupta
J. Wilson
H. Wood;
K. Takaya

Activities: A teaching and research faculty providing a variety of benefits to graduates and undergraduates, the College of Engineering offers CAD programs in structural components, realistic computer graphics, finite element and circuit analysis, mapping and autocartography, PC board design, seed cleaning processes and sensory activities. The software available consists of general building, analysis and design programs, CAI packages and natural grain drying. The College's equipment includes NC machine and shop, access to Cyber 830, a wind tunnel, and three large computers and interfaces. Other facilities include a VAX 11/780, DEC 1160, a CNC lathe, a teaching arm, and vision system to computer.

The college directs its research efforts towards mining and agricultural applications, with emphasis on control and activators, vision, sensors and simulation. Its major accomplishments include hydraulic activator position measurement control; vision interface with computer; automation of mining and agricultural equipment; and a mobile robot with two arms, sonar and voice characteristics, remote control and myoelectric limbs.

UNIVERSITY OF TORONTO

Artificial Intelligence Laboratory
Department of Computer Science
10 King's College Road
Toronto, Ontario
M5S 1A4

Telephone: (416) 978-6025

Senior Contact: Joanne Mager

Activities: The basic research interests of the Artificial Intelligence Laboratory lie in four areas: knowledge representation, knowledge-based systems, computational linguistics and computer vision. Its specializations

are varied and include logical foundations, causal and temporal reasoning, cognitive science and attentive visual processes.

UNIVERSITY OF TORONTO

VLSI Research Group
Department of Electrical Engineering
Toronto, Ontario
M5S 1A4

Telephone: (416) 978-8658

Chief Executive Officer: Professor
C. A. T. Salama, Chairman

Activities: The VLSI Research Group's essential function involves researching VLSI and electronic chip design, applications, testing and technology. Its areas of specialization include electronic CAD and simulation and IC technology and circuits. Device simulation utilizes gemini sedan (2D), (2D), minimos (2½D), and suxes; process simulation employs suprem II and III (1D), supra and sampla (2D). In IC circuits, the Group's specializations focus on schematic entry and netlist generation, logic and circuit simulation, timing verification and mask. Its facilities include VAX 11/782, Metheus CV 750 Station, and six AED 512 graphics stations.

UNIVERSITY OF TORONTO

Robotics and Automation Laboratory/
Computer-Aided Design Laboratory
Department of Mechanical Engineering
5 King's College Road
Toronto, Ontario
M5S 1A4

Telephone: (416) 978-7198

Chief Executive Officer: Dr. R. D. Ventelr,
Chairman

Senior Consultants: Dr A. Goldenburg,
Professor
Dr R. G. Fenton, Professor;
Dr. W. Johnson, Professor
Dr B. Tabakrok, Professor

Activities: The Robotics and Automation Laboratory conducts fundamental and applied research under contracts from government and industry, and serves as an educational tool for graduates and undergraduates. Its robotics research includes tactile sensing, end effector control, kinematics and dynamics, a multi-fingered articulated gripper and vision systems. The software programs devised or used include UTEMP, Inverse Kinematics, computed torque techniques and robot simulation. The lab's workstations consist of IBM 3250/5050 and VAX 11/780, interactive with CADMA/CATIA software; and Tektronix, with Accugraph software.

UNIVERSITY OF TORONTO

Microelectronics Development Centre
777 Bay Street, 4th Floor
Toronto, Ontario
M5G 2C8

Telephone: (416) 978-5095
Telex: 06-21895

Chief Executive Officer: Adel S. Sedra,
Executive Director

Senior Engineering Consultant: Adrian Hartog,
Chief Engineer

Activities: The centre helps Canadian manufacturers and processors apply microelectronics to their operations. It specializes in a full range of design services in the area of integrated circuits, including gate array, standard cell and analogue. It has designed a high-level cell library to ease the interface between centre customers and silicon foundries. The

sequence of the centre's design service includes preliminary determination of the appropriate process, schematic entry of the design into a CAD system, circuit simulation and verification, fault grading, post-layout timing verification, and dc/ac testing of prototype chips. The hardware available includes a Mentor IDEA 1000 system, an AED 512 Colour Display terminal, access to a VAX 780 and HP Plotter 758, and a Versatec plotter and tape drive.

UNIVERSITY OF WESTERN ONTARIO

Faculty of Engineering Science
Robotics Laboratory
1151 Richmond Street
London, Ontario
N6A 3K7

Telephone: (519) 679-3894

Senior Researcher: J. A. MacDonald, Associate
Professor

Activities: The Robotics Laboratory emphasizes research in sensor development, prosthesis, kinematic modelling and pattern recognition. Its recent efforts have focused on feed-back control systems and the design of micros. Most activity emphasizes material handling problems, with application in the transfer of parts and assembly on transfer lines. Facilities include a pick-and-place robot, a DEC 10, CYBER, PRIME 500, and personal computers. The faculty's software programs are written in source code mnemonics for use with a Motorola MEK 6809 D4 kit.

UNIVERSITY OF WINDSOR

Faculty of Engineering
CAD/CAM Centre
Windsor, Ontario
N9B 3P4

Telephone: (519) 253-4232

Chief Executive Officer: Dr W. C. Miller,
Director

Activities: The CAD/CAM Centre undertakes technology transfer through student CAD/CAM projects in co-operation with industry, and conducts research for industrial organizations. Its mechanical and electronic facilities, robotics and automated inspection systems have applications in quality control. The centre has conducted research and development in mechanical concepts, VLSI design, robotics, computervision and CIM in general. It has extensive software capability in a variety of CAD and CAM areas including an Applicon BRAVO package, consisting of three-dimensional solids modelling, finite element analysis, tool path generation and NC machine programming. The centre's computer facilities include DEC VAX 11/785 and 11/750 with Ethernet connection, 40 medium resolution colour graphics terminals, an RM501 robot and more.

**WATERLOO CENTRE FOR COMPUTER INTEGRATED
MANUFACTURING (WATCCIM)**

Department of Mechanical Engineering
University of Waterloo
University Avenue
Waterloo, Ontario
N2L 3G1

Telephone: (519) 885-1211

Co-ordinator: Hugh R. Martin, Professor,
Mechanical Engineering

Senior Consultants: Andrew Wong, Professor,
Systems Design
John Buzacott, Professor, Management
Science
Gerry Sullivan, Associate Professor,
Chemical Engineering
William Wilson, Associate Professor,
Electrical Engineering

Activities: The mandate of this new centre is to encourage research in the new manufacturing technologies, to conduct contract research, organize seminars, offer professional upgrading programs, and provide interaction between the university and industry. Research is underway in vision systems and mobile robots. The centre's workshop facilities consist of a machining centre, lathes, milling NC, a grinder, VAX 11/750 and 780, Calma workstations, and an IRI robot.



Government
of Canada

Gouvernement
du Canada

Regional Industrial
Expansion

Expansion industrielle
régionale