

SECTOR STRATEGIES AND ACTIVITIES

Advanced Manufacturing Technologies

A International Environment

Advanced manufacturing technologies (AMT) are computer-controlled or microelectronics-based machines, such as industrial robots, computer-controlled (CNC) machine tools and computer-aided engineering (CAE) software, which are used in the design, manufacture and production control of discrete products, such as automobiles, electronics or aircraft.

In 1990, worldwide investment in AMT products, services and systems was \$57 billion. It is estimated to be increasing at a compound annual growth rate of 13 per cent and, by the year 2000, is forecast to be \$202 billion. North America currently represents 53 per cent of the world market. However, if Asian and European investment continues to grow at its current rate, their share will increase to 52 per cent by 2000.

Japan and Germany are major exporters of AMT products. Japan is a leader in producing machining centres, industrial robots and flexible manufacturing systems, while Germany has established a lead in precision machining technologies and has built a strong export machine tool industry. Companies using and supplying AMT in these two countries have developed a lead over their competitors, through greater collaboration due to their ability to rapidly develop and apply new technologies. The United States dominates the factory systems integration market, primarily due to its strengths in computer software and hardware development.

Internationally, the use of advanced technologies in designing and manufacturing products has become a necessary basis for competitiveness. By combining AMT with new production methods, (e.g. Just-in-Time production, concurrent engineering and Total Quality Management), manufacturing firms are reducing costs associated with defects and inventory, improving productivity and responding more quickly to changes in customer needs.

Leading edge manufacturers throughout the world are now using the lean manufacturing paradigm, and the focus is on developing the systems, equipment and the organizational tools to perfect the next paradigm, called "Agile Manufacturing" in the United States. Europe, Japan and the United States have major government-led initiatives to integrate AMT capabilities. Following a Japanese proposal in 1990, Australia, Canada, Europe, Japan and the United States are co-operating in a joint technology development program, the Intelligent Manufacturing Systems (IMS) Program, which is to develop the factory of the 21st century. The Program, now in the feasibility stage, aims to develop international standards for the next generation of industrial technologies, while sharing the costs and risks. IMS represents a unique opportunity for Canadian manufacturers to participate in next generation technology developments.

B Domestic Position

Canadian advanced manufacturing technologies companies include systems integrators, producers of machine tools, automated manufacturing systems, plastic processing machines and manufacturing software developers. In 1990, there were approximately 250 such producers in Canada, and shipments were about \$1.4 billion. Exports were \$840 million, or about 60 per cent of output, and imports were \$1.4 billion. The sector employed some 17,000 persons.

The major markets for Canadian products and services are those countries with a modern manufacturing base. These markets include the United States, Japan, Western Europe, Latin America (primarily Mexico), Taiwan, Korea, Malaysia, Hong Kong and Thailand. The Japanese and German markets, the second and third largest, remain difficult to penetrate because of the preference by users in those countries for domestically manufactured products. Canadian firms have had more success in the United States, Mexico, Britain, France and Italy.

Canadian manufacturers of AMT products are generally much smaller than their competitors in other countries. The largest Canadian firms report annual sales of between \$200 and \$300 million. Competitor firms such as Allen-Bradley, Mitsubishi and Siemens have sales many times greater and have established international marketing channels.

Successful, fast growing Canadian firms have invested in developing proprietary technologies and have pursued niche-marketing strategies. Conversely, Canadian firms that conduct little or no R&D and which serve only the domestic market are in many cases in decline.

C Strategic Direction

International marketing and technological enhancement are critical capabilities for companies operating in this sector. Niche marketing and ongoing investment in research and development are priorities. In terms of product areas, integration technologies, advanced robotics and specialized machine tools are promising market segments. Canadian companies seeking to develop leading-edge technologies in several advanced areas are participating in IMS pilot projects now under way.

Canadian companies recognize the importance of developing the highly skilled machine designers, operators and programmers needed to produce internationally successful AMT products and systems. The ongoing training of Canadian workers will result in a stronger AMT skills base for Canadian companies and is critical to the successful growth of the AMT producer sector in Canada and to the manufacturing sector generally.

In order to pursue international opportunities, the following approaches are advocated in the geographic markets indicated: