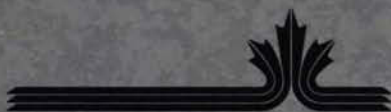


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# and Paper Equipment

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*In a rapidly changing global trade environment, the international competitiveness of Canadian industry is the key to growth and prosperity. Promoting improved performance by Canadian firms in the global marketplace is a central element of the mandates of Industry, Science and Technology Canada and International Trade Canada. This Industry Profile is one of a series of papers in which Industry, Science and Technology Canada assesses, in a summary form, the current competitiveness of Canada's industrial sectors, taking into account technological, human resource and other critical factors. Industry, Science and Technology Canada and International Trade Canada assess the most recent changes in access to markets, including the implications of the Canada-U.S. Free Trade Agreement. Industry participants were consulted in the preparation of the profiles.*

*Ensuring that Canada remains prosperous over the next decade and into the next century is a challenge that affects us all. These profiles are intended to be informative and to serve as a basis for discussion of industrial prospects, strategic directions and the need for new approaches. This 1990-1991 series represents an updating and revision of the series published in 1988-1989. The Government will continue to update the series on a regular basis.*

Michael H. Wilson  
Minister of Industry, Science and Technology  
and Minister for International Trade

**Introduction**

The forest products sector is a major component of the Canadian economy. In 1991, the Canadian forest products sector had shipments totalling \$32.5 billion in current dollars excluding \$2.3 billion shipped from lumber companies to pulp and paper manufacturers and market pulp shipped to the Canadian paper manufacturers. Exports were \$20 billion, of which 65 percent went to the United States. While the total annual shipments are exceeded by the transportation (automobile) industry and the food industry, the forest products sector is the greatest net contributor to Canada's trade balance at \$17 billion.

The forest products sector is of crucial economic importance to all regions of the country and is most prominent in British Columbia where it accounts for 45 percent of manufacturing shipments. Single-industry communities across

the country depend on it for their economic well-being. It provides direct employment for almost 250 000 people, including over 40 000 people in logging activities.

The forest products sector is composed of two major industry groups: paper and allied products industries, and (solid) wood industries. The paper and allied products industries account for approximately 62.2 percent of the value of total shipments and employ approximately 130 000 people inclusive of those in related logging operations. This group is made up of two distinct segments: firms producing pulp and paper (market pulp, newsprint, fine papers, paperboard and tissue) and those making converted or value-added paper products (packaging, business forms, stationery and other consumer paper products).

Wood industries account for 37.8 percent of the value of total shipments and employ approximately 120 000 people





inclusive of those in related operations. This group consists of two segments: firms making commodity products (lumber, plywood, shakes and shingles, veneer, particleboard, medium-density fibreboard and oriented strandboard (OSB)/wafer-board), and those manufacturing value-added wood products (manufactured housing, doors, windows, kitchen cabinets, hardwood flooring, pallets and millwork).

A related industry profile dealing with *Forestry Equipment* as well as the following lumber and allied lumber products industries are available:

- *Lumber*
- *Value-Added Wood Products*
- *Wood-Based Panel Products*
- *Wood Shakes and Shingles*

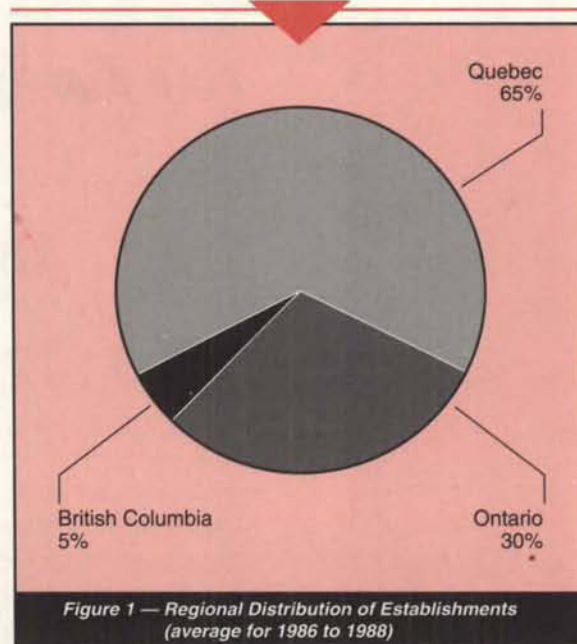
## Structure and Performance

### Structure

The pulp and paper equipment industry comprises manufacturers whose primary product is machinery used by pulp processing and papermaking companies. Pulp processing equipment is used to convert whole logs to chips and chips to pulp either by a chemical process, a mechanical process, or a combination of the two. Papermaking equipment is used in the production of various grades of paper stock — kraft papers, newsprint, tissue and linerboard.<sup>1</sup>

In 1990, the industry consisted of approximately 50 establishments employing some 4 000 people. The industry is made up of companies of various sizes, with annual shipments ranging from \$1 million to \$80 million. The largest companies employ up to 350 people. Most establishments are located in the urban centres of Quebec (65 percent), Ontario (30 percent) and British Columbia (5 percent), where materials and skilled labour are concentrated (Figure 1).

In 1990, industry shipments totalled \$438 million, of which \$189 million (43 percent) were exported. Imports for the same year were \$521 million, 68 percent of the Canadian market of \$770 million. Pulp and paper equipment represents about a fifth of pulp and paper industry investment in machinery and equipment for 1990. The industry used the remaining investment to buy machinery and equipment from more general suppliers for items ranging from environmental equipment to office equipment.



The industry can be categorized into two groups — Canadian-owned companies that develop their own technology, and foreign-owned subsidiaries that primarily use technology developed by parent companies. The latter group has a dominant supply position and employs the majority of the work force in the Canadian pulp and paper equipment industry. Out of the entire industry, half of the companies dedicate all of their production capacity to the manufacture of specialized equipment either for pulp and chip processing or for papermaking. This half of the companies account for 80 percent of industry shipments. The remaining companies produce equipment that is used by a variety of industry sectors in addition to pulp and paper equipment.

There are three principal suppliers in the world of wide, high-speed papermaking machines, two of which have operations in Eastern Canada to serve the Canadian market. While such components as press rollers, shells, dryer cylinders and calender stack rolls (chilled iron type) are still imported, the Canadian facilities are geared to finish and assemble these components as well as to produce the complete paper machines. The third company supplies new paper machines manufactured in Brazil and does major rebuilding to upgrade existing machinery in Canada. This company recently acquired

<sup>1</sup>Machinery used to convert paper reels and sheets into products such as cartons, bags, boxes or envelopes is not included in this profile. Because machinery of this type is largely imported, its inclusion would distort the performance of the included industries.





a manufacturing facility in Western Canada that, in addition to its own product line, also manufactures spare and small parts and functions as a service centre.

Some of the major pulp and paper equipment companies have extensive process and machinery capabilities and supply complete systems to both the domestic and foreign markets. The remainder are companies that manufacture specific products such as boilers, liquid-solid separators, pumps and controls. Although these products are closely associated with the pulp and paper equipment industry, they also have applications in a variety of other industries.

The Canadian industry's strongest manufacturing capability lies in equipment used in the production of high-yield chemi-thermomechanical pulp (CTMP). For this purpose, several manufacturers supply a wide range of machinery, from complete systems for pulp processing to specific equipment for chip impregnation, refining, pulp screening, bleaching, thickening and effluent recycling. Canadian pulp and paper equipment companies also manufacture equipment used in the production of chemical pulp, such as digesters; pulp washing, bleaching, thickening and screening machinery; and chemical recovery boilers. Canadian paper machine manufacturers have found niche markets in certain aspects of papermaking, such as the manufacture of pulp drying machines, the conversion of single-wire (fourdrinier) machines to twin-wire arrangements and the rebuilding of older, smaller machines to convert from newsprint to uncoated mechanical printing paper (UMPP).

### Performance

Most foreign-owned subsidiaries of pulp and paper equipment firms were established in Canada in the 1950s and 1960s, during a period of major capital investment in the Canadian pulp and paper industry. Foreign ownership in the pulp and paper equipment industry increased during the 1980s, largely because of a general trend towards globalization. Additionally, several Canadian-owned manufacturers that had developed specialty equipment were taken over by major international firms, particularly those from Finland. The Canadian pulp and paper equipment industry is now dominated by multinational corporations with operations in a number of countries. Accordingly, the performance of the Canadian industry is best presented in the context of global trends, particularly as they affect the North American market.

In the mid-1970s, due to increased world competition and relatively low profits, the Canadian pulp and paper industry began to move away from its traditional products and started to produce more specialty grades of paper. These developments involved major capital investments to expand capacities, upgrade equipment and convert facilities. These

investments continued as a result of increased demand in the United States, particularly for specialty papers.

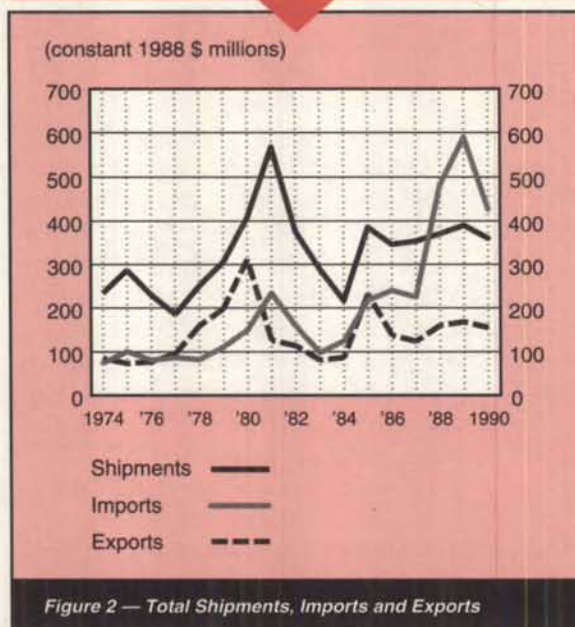
The 1980s was a period of considerable adjustment for the pulp and paper equipment industry throughout the world. This adjustment was caused primarily by major technological changes and rationalization through takeovers and amalgamations. During the unprecedented wave of capital investment in the Canadian pulp and paper industry during the investment boom from 1985 to 1989, Canada became a world leader in the production of bleached chemi-thermomechanical pulp (BCTMP). This leadership is based on the development of process technology and machinery that help pulp processors achieve higher yields, including the utilization of aspen wood fibres. Canadian leadership is also based on the construction of mills with near-zero effluent discharge, for example, the Millar Western Pulp plant at Meadow Lake, Saskatchewan.

The result of this period of adjustment was the emergence of three major pulp processing equipment producers with a world domination in the manufacture of mechanical pulping equipment. The dominant company has concentrated upon very large-scale equipment. The third largest competitor has gained global recognition through intensive commitments to technology research, development, quality and customer service. This company manufactures all products completely in Canada for worldwide markets. It has recently been acquired by a Norwegian company whose intention is to maintain the Canadian facility as a centre of excellence for the development of mechanical pulping systems and to leave it with a worldwide mandate for their manufacture. The other two major companies rely on their foreign parents for their technology and work closely with local machine shops to achieve approximately 85 percent Canadian content in their deliveries to domestic customers.

Between 1985 and 1989, the world pulp and paper industry experienced a further significant increase in market demand and high profits. Consequently, capital investments in both modernization and new projects were at a record high, particularly in North America, South America and Australia.

The Canadian market for pulp and paper equipment, as a result, increased at a real growth rate exceeding 16 percent per year from 1979 to 1988 to reach \$693 million in 1988. However, because some of these new investments involved technologies that already existed in Europe, particularly for paper finishing equipment, imports of pulp and paper equipment increased significantly. In 1988, imports totalled \$482 million, increasing from \$98 million (in constant 1988 dollars) in 1983 (a real growth rate of 29 percent per year over the five-year period). Continuing the analysis in constant 1988 dollars, imports peaked at \$589 million in 1989 before declining to \$427 million in 1990 (Figure 2) as





shipments to new installations and modernized facilities were completed. Similarly, in 1989, the Canadian market peaked at \$811 million before declining to \$632 million in 1990. These shipments paralleled a period in which capital investments rose and then fell.

Exports over the same period increased from \$81 million in constant 1988 dollars in 1983 to \$160 million in 1988. In 1989, exports rose to \$168 million and then declined slightly to \$155 million in 1990. The United States has traditionally been the largest export market for Canadian pulp and paper equipment, accounting for 78 percent of the \$160 million exported in 1988. However, a contract for an overseas turnkey plant can substantially alter the pattern of exports. For example, in 1985, one plant in Asia received more than \$100 million in Canadian pulp and paper equipment exports.

The trend towards the use of higher-yielding pulping processes, higher-speed paper machines and the production of specialty grades of paper has had several major effects on the pulp and paper equipment industry. Global suppliers, in order to remain competitive, are now bidding on larger, more integrated processes of the paper mill. To do this effectively, they have acquired smaller companies having complementary technologies and manufacturing capabilities. As a result, several Canadian companies that had developed expertise in selected markets were bought by international firms during the 1980s.

The Canadian pulp and paper equipment industry has responded well to demands for technological change,

particularly those involving environmental issues. Canadian manufacturers have responded to demands to minimize harmful effluent discharges in pulp and papermaking processes. These changes, together with the productivity changes necessary to improve competitiveness, have required large expenditures on research and development (R&D) and on improving engineering capabilities. Most companies have introduced computer-aided design and computer-aided manufacturing (CAD/CAM) technologies into their operations to support their engineering and production human resources and to improve their productivity.

## Strengths and Weaknesses

### Structural Factors

The competitiveness of the pulp and paper equipment industry is influenced by such key factors as quality, technology, customer service and financing. The Canadian heavy-equipment manufacturing sector was initially established to make equipment for a variety of resource industries, such as those involved in mining or producing pulp and paper. As a result, its facilities are generally well-equipped and well-organized to meet the required high quality standards. These manufacturing facilities, while flexible, may be generally less efficient than those of single-industry suppliers because they require more set-ups per finished item.

The Canadian pulp and paper equipment industry is recognized worldwide for its capabilities in manufacturing high-quality equipment for high-yielding mechanical and chemical pulping and papermaking. To date, Canadian equipment has had limited use in such paper finishing processes as coating and supercalendering, although these are gaining in market importance. In Canada, there are no commercial ownership relationships between equipment manufacturers and pulp and paper manufacturers as there are in Sweden and Finland. This absence adversely affects the Canadian industry in three ways. First, the lack of commercial linkages constrains Canadian manufacturers from exporting equipment to pulp and paper producers in these countries. Second, Canadian manufacturers have difficulty in working with foreign pulp and paper equipment manufacturers on research projects for prototype machinery while maintaining technical confidentiality between the foreign firms and their owners. Third, where the purchaser of the equipment also owns the equipment manufacturer, the equipment manufacturer is virtually guaranteed its initial sales of newly designed equipment, thereby minimizing any R&D risks. Canadian pulp and paper equipment manufacturers therefore may have to use alternative approaches for R&D or development and field testing of prototype machinery —





for example, through alliances and working arrangements with Canadian pulp and paper companies — to counter the barriers created by their lack of such ownership linkages.

While R&D expenditures in this industry amount to approximately 3 percent of annual sales in Sweden and Finland, many Canadian-owned companies with leading-edge technologies in their field have been investing large sums in R&D, often spending 7 percent of their annual sales. This commitment to R&D should position these Canadian pulp and paper equipment and technology suppliers favourably in the global marketplace.

Because each new pulp and paper project requires extensive process engineering to apply standard products to the client's needs, it is essential for suppliers to this industry to have strong technical support for their marketing efforts in each area they serve. The operation and maintenance of this equipment can be difficult for Canadian companies, which are generally smaller than their competitors. Foreign suppliers have responded to this need for service by establishing local marketing and engineering offices in Canada. These local offices can provide technical expertise and backup services that are equivalent to those of the domestic firms.

### **Trade-Related Factors**

Tariffs are not generally a major factor inhibiting world trade in this industry. The tariff assessed by Canada on pulp and paper equipment imported from countries having Most Favoured Nation (MFN) status is currently set at 9.2 percent. Comparable MFN major import tariffs of other countries are as follows: United States, 0.8 to 4.2 percent; European Community (EC), 3.8 to 4.1 percent; and Finland, 5.1 percent.

The exception to the general pattern of moderate tariffs is Brazil, which assesses tariffs on imported pulp and paper equipment of approximately 40 percent. Furthermore, Brazil, in addition to setting high tariffs, requires import licences, which can impede trade when they are difficult to obtain. Because Brazil is classified as a developing nation, pulp and paper equipment imports from that country enter Canada under the General Preferential Tariff (GPT) rate of 2.5 percent. Some pulp and paper equipment not manufactured in Canada can be imported duty-free under the federal Machinery Program.

Under the Canada-U.S. Free Trade Agreement (FTA), implemented on 1 January 1989, tariffs between Canada and the United States on pulp and paper equipment were phased out in five annual, equal steps ending on 1 January 1993. The FTA also provides for cross-border mobility of service personnel; the lack of such mobility was sometimes a problem for Canadian exporters attempting to carry out maintenance of their equipment in the United States before the FTA.

Non-tariff barriers (NTBs) are not generally a significant factor in the world pulp and paper equipment trade. However, a significant exception arises in Nordic countries, where governments have control of the natural resources and participate in the ownership of both the pulp and paper and the associated equipment sectors. This linkage has inhibited foreign penetration of these markets in the same manner as private ownership linkages between equipment manufacturers and the end users have done.

### **Technological Factors**

A number of Canadian-owned firms have undertaken major commitments to research and product development. Having attained world leadership positions in such areas as the production of BCTMP, screening and under-the-machine repulping, the value of exports of these firms is becoming significant.

There has been a recent global trend in the industry to increase the production of supercalendered and coated papers. The technology for these processes was largely developed and commercialized offshore, with the result that all of this type of machinery must be imported. The lack of indigenous Canadian R&D in paper finishing makes it unlikely that these products and machines will be manufactured to any great extent in Canada.

Purchasers of pulp and paper equipment want high-performance technology with a proven track record. Because the Canadian pulp and paper equipment manufacturing industry consists primarily of subsidiaries of foreign-owned companies, firms are highly dependent on their parents for technology. Canadian and several foreign firms support the Pulp and Paper Research Institute of Canada (PAPRICAN) through its Allied Industry and Government Support Program. Active participation between manufacturers and users of technology minimizes risks and accelerates adoption of new technologies. However, multinationals have located the bulk of their R&D at research centres and pilot plants near their corporate headquarters. Through the transfer of technology, the subsidiaries benefit from the results emanating from these centres.

### **Other Factors**

At the time of writing, the Canadian and U.S. economies were showing signs of recovering from a recessionary period. During the recession, companies in the industry generally experienced reduced demand for their outputs, in addition to longer-term underlying pressures to adjust. In some cases, the cyclical pressures may have accelerated adjustments and restructuring. With the signs of recovery, though still uneven, the medium-term outlook





will correspondingly improve. The overall impact on the industry will depend on the pace of the recovery.

In early 1990, most Canadian equipment producers were operating on their backlog, with very few new orders coming from the domestic market. Companies have increased their efforts to market equipment offshore in order to counter the slowing domestic market situation into the mid-1990s.

## Evolving Environment

Between 1990 and 1991, Canadian production of pulp and paper dropped from 94 percent of capacity to 84 percent. The recent rapid expansion of new papermaking machines has made some older Canadian mills with slower, lower-capacity papermaking machines marginal. Furthermore, many U.S. mills face lower transportation costs on key inputs than Canadian counterparts do. Rapidly growing southern pine, which reaches maturity in 20 to 30 years, provides mills in the southern United States with lower-cost fibre than that available to Canadian mills. However, the quality of Canadian fibre is still considered superior and is continuing to offer competitive advantages compared with the rest of the field. In addition, requirements to recycle used paper favour U.S. plants, which are closer to the major urban centres that generate most recyclable paper. Far more used newsprint is available in the United States. Many Canadian mills pay a high premium for recycled paper due to longer back-haulage and competition for recyclable stock.

There are two major product groups in which the Canadian pulp and paper equipment industry must invest if it wishes to continue operating at or near present levels. One product group is specialized equipment that would allow mills to operate with a minimum or zero effluent discharge. Such equipment will be needed to meet opportunities arising from the upgrading of environmental regulations. The success of firms in taking advantage of these opportunities will depend on the timing of the introduction of the regulations that will increase demand. Leading equipment firms are working closely with PAPRICAN and innovative manufacturers of pulp and paper to design and build these new systems. A second area is in the development of equipment such as de-inking systems needed to meet clients' demands for a certain percentage of recycled fibres in their product. The industry, through PAPRICAN, is working co-operatively on many such projects.

Competition with other industries for environmental engineers and scientists, as well as skilled tradespeople, may constrain industry human resource development and growth during the early 1990s.

Industry rationalization in response to market pressures and the trend to globalization by certain multinationals has decreased Canadian opportunities to market some equipment such as complete paper machines, winders and rewinders. With Canada approaching its maximum yield for sustainable development of its softwood forests, the ongoing supply of softwood represents a major challenge to the Canadian pulp and paper industry and its equipment suppliers. Material inputs will grow with improved silviculture and greater utilization of hardwoods.

Responses are being made to this challenge. R&D has made aspen and poplar BCTMP a uniquely Canadian development and may create significant investment opportunities in equipment and facilities. Other R&D projects now under way, such as alcohol pulp (Alcell), a greater consumption of underutilized species, such as aspen and poplar, recycling methodologies and energy saving technologies are providing additional growth opportunities for the machinery and equipment industry.

In general, the need for conservation and cost controls is forcing the industry into high yield processes. Canada's leadership position in this area is significant and may provide further opportunities for equipment development.

Canadian consulting engineers specializing in pulp and paper technology have traditionally been responsible for most of Canada's export of pulp and paper equipment outside North America. They have usually spearheaded Canada's participation in overseas projects that involved financing arranged through the Export Development Corporation (EDC). EDC's Canadian-content requirement of such projects (60 to 80 percent) has resulted in foreign companies allowing their Canadian subsidiaries to bid on projects outside their assigned market. Canadian-owned equipment suppliers, however, are aggressively and actively pursuing their own export market opportunities.

On 12 August 1992, Canada, Mexico and the United States completed the negotiation of a North American Free Trade Agreement (NAFTA). The Agreement, when ratified by each country, will come into force on 1 January 1994. The NAFTA will phase out tariffs on virtually all Canadian exports to Mexico over 10 years, with a small number being eliminated over 15 years. The NAFTA will also eliminate most Mexican import licensing requirements and open up major government procurement opportunities in Mexico. It will also streamline customs procedures, and make them more certain and less subject to unilateral interpretation. Further, it will liberalize Mexico's investment policies, thus providing opportunities for Canadian investors.

Additional clauses in NAFTA will liberalize a number of areas including land transportation and other service sectors.





The NAFTA is the first trade agreement to contain provisions for the protection of intellectual property rights. The NAFTA also clarifies North American content rules and obliges U.S. and Canadian energy regulators to avoid disruption of contractual arrangements. It improves the dispute settlement mechanisms contained in the FTA and reduces the scope for using standards as barriers to trade. The NAFTA extends Canada's duty drawback provisions for two years, beyond the elimination provided for in the FTA, to 1996 and then replaces it with a permanent duty refund system.

## Competitiveness Assessment

Canadian pulp and paper equipment manufacturers have developed the technical expertise to compete in both the domestic and overseas markets. They will need to aggressively market their capabilities domestically to establish a base of proven equipment. While the smaller Canadian-owned companies are active in the export market, the larger Canadian subsidiaries of foreign-owned companies compete for roles and mandates in international projects within their own firms. At times, their ability to succeed depends on Canadian export financing assistance, which requires them to have a domestic content.

Chemical pulp and newsprint traditionally have been the major products demanded from the Canadian pulp and paper industry. However, demand is changing. New pulping technology and paper mill modernizations and expansions mark a shift towards higher-yielding pulp processes, the use of recycled fibres and the making of specialty papers. Canadian equipment manufacturers can successfully compete in the production of pulping equipment (e.g., refiners), pulp mills and some types of papermaking equipment and, with less success, in the manufacture of complete papermaking machines.

Although Canadian equipment manufacturers are more than keeping pace with technology developments internationally, the relatively small scale of indigenous R&D keeps the industry from being at the leading edge of developments in every field. For example, in one particular area of growing importance — paper finishing equipment — counterparts in Scandinavia and other European countries have already developed the required technology. As a result, there is little Canadian production of coating or supercalendering machinery, although these areas may give rise to opportunities for licensing or technology transfers. PAPRICAN is demonstrating strength in developing energy-efficient drying techniques, instrumentation and bipolar-membrane systems for chemical recovery and water purification systems. Technological changes and the trends towards specialization and rationalization of the

pulp and paper equipment industry internationally should continue throughout the 1990s.

Recently introduced legislation and growing public awareness have focused attention on both environmental protection and recycling issues. The pulp and paper equipment industry will be required to concentrate more of its effort on meeting environmental requirements over the next decade.

The future performance of the Canadian pulp and paper equipment industry depends on its continuing ability to work closely with the pulp and paper companies and with universities and research institutes. Further process and product technology through increased R&D may result from these improved linkages. The success of Canadian consulting engineers in winning contracts for large overseas turnkey projects will continue to be an important source of demand for Canadian pulp and paper equipment manufacturers.

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## PRINCIPAL STATISTICS<sup>a</sup>

	1978 <sup>b</sup>	1983	1984	1985	1986	1987	1988	1989	1990
Establishments	N/A	N/A	N/A	N/A	N/A	50	50	50	50
Employment	N/A	N/A	N/A	N/A	N/A	4 000	4 000	4 000	4 000
Shipments									
(\$ millions)	133	244	189	345	312	330	371	448	438
(constant 1988 \$ millions)	251	289	217	386	346	354	371	390	360

<sup>a</sup>ISTC estimates.

<sup>b</sup>Data for this year are not strictly comparable with data for other years shown due to changes in the definition of the industries that were introduced in the revised edition of *Standard Industrial Classification, 1980*, Statistics Canada Catalogue No. 12-501.

N/A: not available

## TRADE STATISTICS

	1978 <sup>a</sup>	1983	1984	1985	1986	1987	1988 <sup>b</sup>	1989 <sup>b</sup>	1990 <sup>b</sup>
Exports <sup>c</sup>									
(\$ millions)	84	68	75	207	124	115	160	193	189
(constant 1988 \$ millions)	159	81	87	232	137	124	160	168	155
Domestic shipments <sup>d</sup>									
(\$ millions)	49	176	114	138	188	215	211	255	249
(constant 1988 \$ millions)	92	208	130	154	209	230	211	222	205
Imports <sup>e</sup>									
(\$ millions)	44	83	108	195	216	210	482	677	521
(constant 1988 \$ millions)	82	98	125	217	240	225	482	589	427
Canadian market <sup>d</sup>									
(\$ millions)	93	259	222	333	404	425	693	932	770
(constant 1988 \$ millions)	174	306	255	371	449	455	693	811	632

<sup>a</sup>Data for this year are not strictly comparable with data for other years shown due to changes in the definition of the industries that were introduced in the revised edition of *Standard Industrial Classification, 1980*, Statistics Canada Catalogue No. 12-501.

<sup>b</sup>It is important to note that data for 1988 and after are based on the Harmonized Commodity Description and Coding System (HS). Prior to 1988, the shipments, exports and imports data were classified using the Industrial Commodity Classification (ICC), the Export Commodity Classification (XCC) and the Canadian International Trade Classification (CITC), respectively. Although the data are shown as a continuous historical series, users are reminded that HS and previous classifications are not fully compatible. Therefore, changes in the levels for 1988 and after reflect not only changes in shipment, export and import trends, but also changes in the classification systems. It is impossible to assess with any degree of precision the respective contribution of each of these two factors to the total reported changes in these levels.

<sup>c</sup>See *Exports by Commodity*, Statistics Canada Catalogue No. 65-004, monthly.

<sup>d</sup>ISTC estimates.

<sup>e</sup>See *Imports by Commodity*, Statistics Canada Catalogue No. 65-007, monthly.





### SOURCES OF IMPORTS<sup>a</sup> (% of total value)

	1983	1984	1985	1986	1987	1988 <sup>b</sup>	1989 <sup>b</sup>	1990 <sup>b</sup>
United States	60	67	50	44	50	40	36	41
European Community	24	20	36	22	17	21	21	24
Asia	3	5	5	5	5	4	5	4
Other	13	8	9	29	28	35	38	31

<sup>a</sup>See *Imports by Commodity*, Statistics Canada Catalogue No. 65-007, monthly.

<sup>b</sup>Although the data are shown as a continuous historical series, users are reminded that HS and previous classifications are not fully compatible. Therefore, changes in the levels for 1988 and after reflect not only changes in import trends, but also changes in the classification systems.

### DESTINATIONS OF EXPORTS<sup>a</sup> (% of total value)

	1983	1984	1985	1986	1987	1988 <sup>b</sup>	1989 <sup>b</sup>	1990 <sup>b</sup>
United States	69	76	42	63	77	78	73	62
European Community	2	5	2	4	4	6	5	6
Asia	2	4	50	13	1	3	7	6
Other	27	15	6	20	18	13	15	26

<sup>a</sup>See *Exports by Commodity*, Statistics Canada Catalogue No. 65-004, monthly.

<sup>b</sup>Although the data are shown as a continuous historical series, users are reminded that HS and previous classifications are not fully compatible. Therefore, changes in the levels for 1988 and after reflect not only changes in export trends, but also changes in the classification systems.

### REGIONAL DISTRIBUTION<sup>a</sup> (average over the period 1986 to 1988)

	Atlantic	Quebec	Ontario	Prairies	British Columbia
Establishments (% of total)	—	65	30	—	5
Employment (% of total)	—	70	25	—	5
Shipments (% of total)	—	70	25	—	5

<sup>a</sup>ISTC estimates.





## MAJOR FIRMS<sup>a</sup>

Name	Country of ownership	Location of major plants
ABB Flakt Ross Inc.	Sweden	La Salle, Quebec
Andritz Sprout-Bauer Ltd.	Austria	Sherbrooke, Quebec
Beloit Canada Ltd.	United States	Saint-Joseph-de-Sorel, Quebec
Black Clawson-Kennedy Ltd.	United States	Owen Sound, Ontario
Groupe Laperrière & Verreault Inc.	Canada	Trois-Rivières, Quebec
Groupe Laperrière & Verreault (Ontario) Inc.	Canada	Orillia, Ontario
Ingersoll-Rand Canada Inc.	United States	Sherbrooke, Quebec
Kvaerner Hymac Ltd.	Norway	Laval, Quebec
Sunds Defibrator Ltd.	Finland	Saint-Laurent, Quebec
Valmet Montréal Inc.	Finland	Lachine, Quebec

<sup>a</sup>A number of these companies make ancillary equipment only, not pulp and paper equipment *per se*.

## INDUSTRY ASSOCIATION

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## SECTORAL STUDIES AND INITIATIVES

The following initiative is supported by Industry, Science and Technology Canada.

### **Forest Industries R&D and Innovation Program**

The overall objective of the three-year Forest Industries R&D and Innovation Program is to increase the international competitive position of the forest industry by encouraging, through government assistance, increased R&D activity by the industry. The strategic approach is to encourage R&D activity undertaken in alliances with other stakeholders and, thereby, to expand the transfer of technology and accelerate its implementation in advanced forest products and processes in the industry.

An important program delivery mechanism is through strategic memoranda of understanding (MOUs) with companies. The objective is to work with recognized industry leaders to stimulate R&D activity undertaken in cooperative alliances with other partners, including smaller companies and suppliers. A key MOU is with the Pulp and Paper Research Institute of Canada (PAPRICAN), which is to encourage research directed toward addressing the environmental challenges confronting the pulp and paper industry.

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