# Printing Ink



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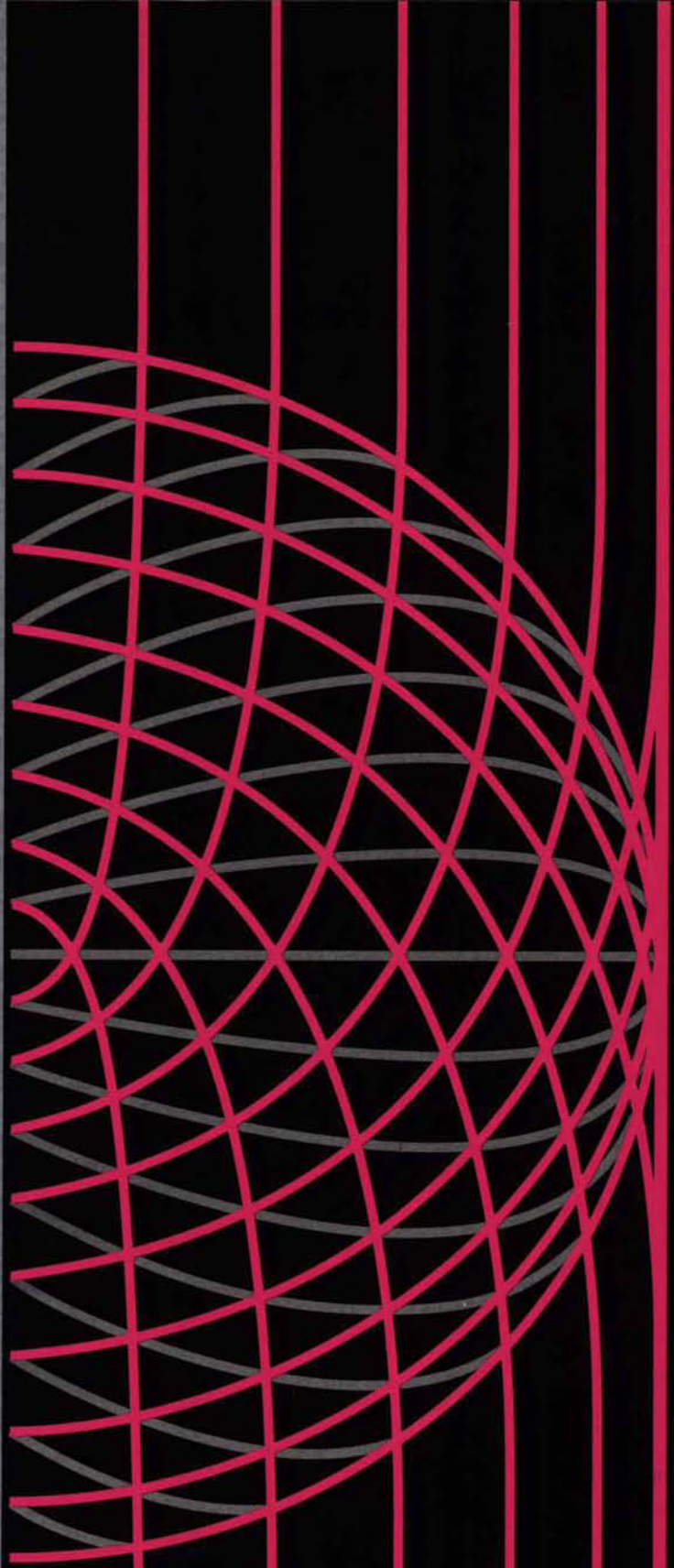
INDUSTRY PROFILE



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I N D U S T R Y P R O F I L E



1990–1991

# PRINTING INK

## FOREWORD

*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

## Structure and Performance

### Structure

Printing inks are mixtures of pigments dispersed in various resins, oils, solvents, water and chemical additives. These mixtures, either in a fluid or paste form, are primary raw materials used in such processes as letterpress, offset/lithography, gravure, flexography, screen or other printing technologies (the glossary at the end of this profile provides a definition of terms for major printing processes).

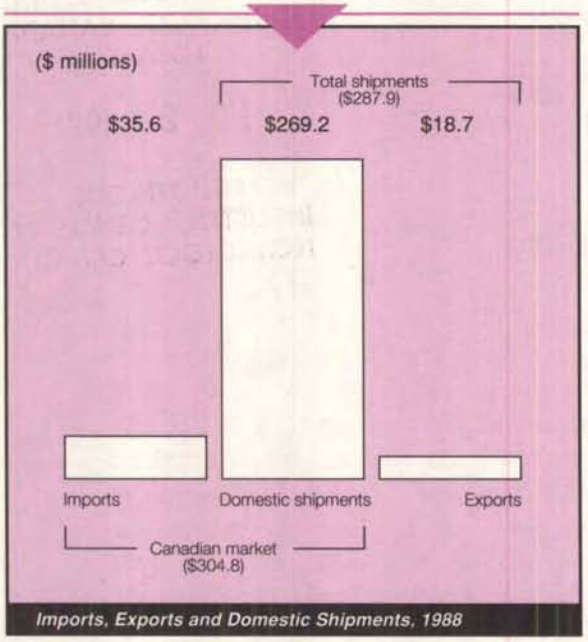
Printing inks are used to produce various printed articles, such as advertising materials, books, business forms, catalogues, packaging, periodicals, posters, securities and wall coverings.

The manufacture of printing inks involves the dispersing of pigments in a liquid carrier through the mixing and milling of the various components. The processing is generally undertaken in batches rather than in a continuous operation.

The larger firms tend to manufacture the ink components at plants located near their markets. This process involves grinding pigment and carrying out other steps that produce basic ink concentrates. These can then be shipped to satellite facilities where the final products are further processed to satisfy the requirements of local markets. Smaller firms serving a geographically small market are more likely to manufacture from a single location.

The type of surface to be printed upon is a major determinant of the type of printing ink used for a specific application. Newsprint, paperboard, coated and smooth-finished papers, uncoated papers, plastic films, glass, textiles, foils and metals all require inks of different specific characteristics. Other determinants of the ink formulation include the printing process employed, the type of press, the curing method used, and the end use of the printed material.

The printing ink industry in Canada comprises 53 establishments primarily engaged in manufacturing



*Imports, Exports and Domestic Shipments, 1988*

printing inks for the graphic arts (printing and publishing) and packaging industries. The industry employed 1 832 people and shipped goods valued at $287.9 million in 1988.

The manufacture of printing inks in Canada is largely oriented towards the Canadian market. The estimated $18.7 million of exports in 1988 represented only 6.5 percent of shipments, of which 96 percent were to the United States. Imports, valued at $35.6 million in 1988, accounted for 11.7 percent of the Canadian market. Almost 89 percent of these came from the United States.

The printing ink sector is geographically concentrated, with 30 of the 53 establishments (57 percent) located in Ontario, 11 establishments (21 percent) in Quebec, and seven (13 percent) in British Columbia. Ontario accounted for about 78 percent of the total employment in 1988 and 75 percent of the value of shipments.

About a third of the firms are subsidiaries of foreign-owned corporations. These companies produce an estimated 70 percent of printing inks manufactured in Canada, and export only very little of their production. Generally, Canadian subsidiaries have not been given unique product mandates.

The six largest companies, four of which are foreign-owned, accounted for approximately 75 percent of the value of shipments in 1988. The largest firms manufacture most printing inks, including commodity products (lithographic inks) and specialty products (flexographic and rotogravure inks) for many end-use applications. Some of the larger companies also import some specialty products for distribution in Canada. The smaller manufacturers tend to supply niche markets with a limited range of products, usually lithographic inks, for a few specific end-use applications.

The distribution of printing inks manufactured in Canada is as follows: lithographing ink, 39 percent; flexographic ink, 18.4 percent; rotogravure ink, 13.2 percent; and letterpress ink, 4.9 percent. Other inks manufactured in Canada include newspaper and stamping inks.

Raw materials and supplies account for about 83 percent of the costs of manufacturing printing inks. The principal raw materials are synthetic resins; pigments, colour lakes and toners; varnishes; refined mineral oils; alcohols and their derivatives; carbon black; titanium dioxide; and printing ink bases. Pigment can represent as much as 70 percent of the total material cost. Most raw materials are imported, primarily from the United States and Europe. Of the remaining manufacturing costs, wages and salaries account for approximately 15 percent.

### Performance

Despite the growth of electronic printing and other non-ink systems that have replaced conventional printing, the value of shipments by the Canadian printing ink industry grew between 1973 and 1982 at a real rate of 5.2 percent. The annual rate of growth between 1982 and 1988 was 4.6 percent.

The number of establishments in the printing ink industry decreased from 59 in 1982 to 53 in 1988. Employment has remained fairly constant through the 1980s, varying between about 1 700 and 1 865.

The size of the Canadian market for printing inks increased at a real annual rate of 5.1 percent between 1973 and 1982 and 4.7 percent between 1982 and 1988. The import share of the Canadian market has increased from 7.8 percent in 1982 to 11.7 percent in 1988.

## Strengths and Weaknesses

### Structural Factors

Factors that influence competitiveness in the printing ink industry in Canada include customer service, proximity to customers, economies of scale, technological ability and costs related to meeting federal, provincial and municipal environmental regulations.

Canadian manufacturing operations in general are not cost-competitive with U.S. firms for high-volume, commodity-type inks. Although labour costs in Canada and the United States are similar, raw material costs are higher in Canada due to the distance between principal markets.

Canadian firms try to compensate for their relatively small size by specializing in high-value, low-volume products.

Printing ink manufacturers provide their customers with individualized technical service in the field. Ink manufacturers must rapidly introduce new formulations to respond to changed customer needs and technological developments by competitors. Customers tend to favour suppliers located close to them because of the greater costs and logistical impediments to receiving good service over longer distances.

The Canadian printing ink industry has operated, and continues to operate, significantly below capacity. Much of the production equipment is designed for larger production runs than Canadian companies require.

### Trade-Related Factors

Prior to the introduction of the Canada-U.S. Free Trade Agreement (FTA), which took effect on 1 January 1989, Canadian ink manufacturers benefited from a tariff protection of 12.5 percent for all printing inks imported from the United States. As well, the lower value of the Canadian dollar provided additional protection.

The U.S. tariff rates prior to the FTA ranged from 1.8 to 3.1 percent. Under the FTA, tariffs on printing inks between Canada and the United States are being eliminated in five annual, equal steps, beginning on 1 January 1989 and ending on 1 January 1993.

Japanese and European Community tariff rates are 4.6 percent and 6.6 percent, respectively, but they have little effect on the printing ink industry, as the market for Canadian inks is largely limited to North America.

### Technological Factors

Raw material suppliers, for the most part located outside Canada, are a major source of technical assistance to the printing ink industry and, in general, the Canadian printing ink industry has ready access to current technology. Major sources of technology are the United States, Japan and some European countries.

Technology related to ink formulations is also available to Canadian subsidiaries from their foreign parents. Only limited research and development is performed in Canada.

Ink users (printers) are making significant investments in human resources and equipment refinements in order to reduce waste, control pollution and improve ink drying. Ink manufacturers work with their customers to develop cleaner products; faster gelling, better drying and setting properties; and faster printing speeds.

The printing ink industry in recent years has been spending a greater portion of its resources on developing improved manufacturing techniques and on becoming more adaptable to the changing market. Some small ink manufacturers compete well in market niches or specialized product areas where their ability to provide customized product and service requirements is their primary strength.

### Other Factors

The Canadian printing ink industry continues to face challenges in increased regulation in such areas as occupational health and safety, waste disposal and transportation of dangerous goods. Compliance with these regulations increases costs and demands on management resources. Specific regulations include the *Hazardous Products Act;* the *Transportation of Dangerous Goods Act;* the *Occupational Health and Safety Act;* the *Workplace Hazardous Materials Information System* (WHMIS); and the *Environmental Protection Act.* While these regulations are accepted as necessary, they are also regarded by the industry as more costly to meet than the regulations faced by competitors in other countries.

## Evolving Environment

Ink manufacturers everywhere are having to adapt to continual changes because of the requirements for new ink formulations. The high degree of technological change in the graphic arts and packaging industries forces manufacturers to develop new formulations of inks on an ongoing basis.

Total ink consumption depends on the demands of the printing, publishing and packaging industries. The value of the market for printing inks is expected to grow at an average annual rate of about 6 percent from 1990 to 1995, with the largest growth in the demand for lithographic ink and flexographic ink. Letterpresses are being replaced by newsprint lithography, so the growth rate for letterpress ink will slow. The market for flexographic ink will grow rapidly, mainly as a result of its use for printing packaging films.

In Canada, the value of shipments for the entire graphic arts industry increased at a real growth rate of 7.8 percent in 1988 over 1987. This figure includes all of the printing, publishing and allied industries; the newsprint industry; the corrugated box industry; the folding carton and set-up box industries; paper bag manufacturers; the signs and displays industry; and miscellaneous paper industries. Should this growth continue, demand in Canada for printing inks throughout the next few years is expected to remain strong.

Many printers in Canada and the United States will continue to require specific ink formulations for specific applications. Packaging designers have introduced numerous new applications for printing inks in recent years. This trend is expected to continue.

The increasing concern for the environment and health in the workplace has brought about a number of innovations. For example, new offset inks are being introduced that are 96.5 percent free of volatile organic compounds (VOC). VOCs, which are present in conventional inks because of the use of petroleum distillates as a major component, are a significant contributor to air pollution problems. The new inks are the first to be made with a high proportion of renewable resources; approximately 70 percent of the raw materials consist of vegetable oils and of alkyd resins derived from them and from forest products. Offset formulations that contain as much as 55 percent soy oil and letterpress formulations with up to 70 percent soy content are now available. These inks offer improved performance characteristics in addition to having a positive environmental impact.

Such innovations are being introduced on a multinational basis. Thus, while Canadian firms are adopting these new formulations, the availability of this technology only helps to maintain but not to enhance the competitiveness of the Canadian industry.

While the major thrust of the ink industry will continue to be the production of high-quality products, the most significant new developments will involve extended use of water-based inks, high-solids inks, and radiation-curable inks, all of which result in reduced solvent emissions. Water-based inks, especially for flexographic and gravure processes, will continue to be developed and increasingly accepted because of environmental, fire, health and safety, and economic concerns. Ink formulations that facilitate the recycling of paper will continue to be developed. Many plastic packaging films are now being printed with water-based inks. Leaded pigments are being replaced by non-leaded ones.

The use of radiation-curable inks, such as ultraviolet and electron beam (EB) inks, is an important step for the printing industry. These inks have no solvents, release no emissions and print well at high speeds. They produce a high-gloss, laminated look for use in printing magazine covers, book jackets, and point-of-purchase displays. Radiation-cured inks, having rapid drying times, will replace some slower-drying, conventional, oil-based lithographic inks used by folding carton converters. With faster drying, the production process can be accelerated and costs reduced. EB drying systems will have a significant role in aseptic packaging for printing and coating applications.

Lithographic and flexographic printing processes are expected to grow rapidly in use. Gravure and letterpress, however, will be under continued attack by both flexographic and web offset processes.

Electronic and desktop printing will continue to supplement, but not replace, conventional printing processes. While some market overlap occurs, these printing processes for the most part complement each other and enhance the efficiency and flexibility of a printing operation.

In recent years, the printing ink sector in Canada has undergone changes as a result of rationalization through mergers, acquisition and new ownership.

Rationalization among its customers, especially printers, has resulted in many changes for the printing ink industry. The resulting larger printers are expected to align themselves with the larger ink suppliers rather than with the small local suppliers, a situation that would result in fewer ink manufacturers.

The elimination of tariffs under the FTA can be expected to reduce the Canadian industry's prices and profits in the Canadian market. Canadian-owned firms will probably achieve, at best, only very modest increases in exports to the United States, because the industry is regionally oriented and provides individualized service for clients. Foreign-owned companies in Canada generally produce goods similar to those manufactured by their parents, so their operations could easily be rationalized with those plants in the United States that are located close to the principal Canadian markets.

The same conditions apply to Canadian companies. With the FTA environment, it is likely that some of the large ink manufacturers in Canada will be able to serve major customers in both Canada and the United States, provided that they are able to develop strategic supplier/customer arrangements. These large ink manufacturers are expected to increase in size, while some of the small manufacturers will likely remain to supply niche markets. The medium-sized firms in Canada could be those facing the largest challenges under the new FTA environment, which will see tariffs eliminated in 1993.

At the time of writing, the Canadian and American 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.

## Competitiveness Assessment

Foreign-owned manufacturers dominate the printing ink industry in Canada. Many firms in the sector either do not compete internationally or export only small volumes. The Canadian printing ink industry, in general, has higher operating costs than its American counterpart. The Canadian industry does not use a significant portion of its capacity.

Rationalization between some foreign-owned plants in Canada and affiliated plants in the northeastern United States will likely be accelerated because of the FTA, but as of early 1991 this has still not occurred. Exports from Canadian-owned facilities are not expected to change significantly under the free-trade environment, but imports are expected to rise.

**For further information concerning the subject matter contained in this profile, contact**

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## PRINCIPAL STATISTICS[a]

| | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 |
|---|---|---|---|---|---|---|---|
| Establishments | 59 | 58 | 58 | 53 | 53 | 53[b] | 53[b] |
| Employment | 1 787 | 1 833 | 1 865 | 1 716 | 1 739 | 1 787 | 1 832 |
| Shipments ($ millions) | 182.6 | 214.3 | 245.3 | 241.0 | 267.1 | 261.6 | 287.9 |

[a]See *Chemical and Chemical Products Industries*, Statistics Canada Catalogue No. 46-250, annual (SIC 3791, printing ink industry).
[b]ISTC estimates.

## TRADE STATISTICS

| | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988[a] |
|---|---|---|---|---|---|---|---|
| Exports[b] ($ millions) | 6.5 | 7.8 | 8.3 | 9.9 | 11.9 | 13.6 | 18.7 |
| Domestic shipments ($ millions) | 176.1 | 206.5 | 237.0 | 231.1 | 255.2 | 248.0 | 269.2 |
| Imports[c] ($ millions) | 14.9 | 17.9 | 21.7 | 19.9 | 22.7 | 28.5 | 35.6 |
| Canadian market ($ millions) | 191.0 | 224.4 | 258.7 | 251.0 | 277.9 | 276.5 | 304.8 |
| Exports (% of shipments) | 3.6 | 3.6 | 3.4 | 4.1 | 4.5 | 5.2 | 6.5 |
| Imports (% of Canadian market) | 7.8 | 8.0 | 8.4 | 7.9 | 8.2 | 10.3 | 11.7 |

[a]It is important to note the 1988 data 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 1988 levels 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 1988 levels.
[b]Estimated data based on U.S. imports. Data on Canadian exports are not available.
[c]See *Imports by Commodity*, Statistics Canada Catalogue No. 65-007, monthly.

## SOURCES OF IMPORTS[a] (% of total value)

| | 1984 | 1985 | 1986 | 1987 | 1988 |
|---|---|---|---|---|---|
| United States | 95 | 94 | 95 | 93 | 89 |
| European Community | 4 | 4 | 3 | 6 | 8 |
| Other | 1 | 2 | 2 | 2 | 4 |

[a]See *Imports by Commodity*, Statistics Canada Catalogue No. 65-007, monthly.

## DESTINATIONS OF EXPORTS[a] (% of total value)

| | 1984 | 1985 | 1986 | 1987 | 1988 |
|---|---|---|---|---|---|
| United States | 96 | 96 | 96 | 96 | 96 |
| European Community | – | – | – | – | – |
| Other | 4 | 4 | 4 | 4 | 4 |

[a]Estimated data based on U.S. imports. Data on Canadian exports are not available.

## REGIONAL DISTRIBUTION[a] (average over the period 1986 to 1988)

| | Atlantic | Quebec | Ontario | Prairies | British Columbia |
|---|---|---|---|---|---|
| Establishments (% of total) | 3 | 21 | 49 | 15 | 12 |
| Employment (% of total) | X | 17 | 73 | X | X |
| Shipments (% of total) | X | 19 | 72 | X | X |

[a]See *Chemical and Chemical Products Industries*, Statistics Canada Catalogue No. 46-250, annual (SIC 3791, printing ink industry).

X: confidential

## MAJOR FIRMS

| Name | Country of ownership | Location of major plants |
|---|---|---|
| BASF Coatings & Inks Canada Ltd. | Germany | Mississauga, Ontario |
| Canadian Fine Color Company Limited | Canada | Toronto, Ontario<br>London, Ontario<br>Montreal, Quebec<br>Vancouver, British Columbia<br>Winnipeg, Manitoba |
| Colmar Ink & Chemical Corporation | Canada | Toronto, Ontario |
| Converters Ink (Canada) Ltd. | United States | Toronto, Ontario |
| Hostmann-Steinberg Limited | Germany | Toronto, Ontario<br>Montreal, Quebec<br>Vancouver, British Columbia |
| Rieger Printing Ink Co. Ltd. | Canada | Toronto, Ontario<br>Burlington, Ontario<br>Montreal, Quebec<br>Edmonton, Alberta<br>Richmond, British Columbia |
| Schmidt Printing Inks Ltd. | Germany | Montreal, Quebec |
| Sinclair & Valentine Inc. | United States | Toronto, Ontario<br>Montreal, Quebec<br>Winnipeg, Manitoba |
| Sun Chemical Limited | Japan | Vancouver, British Columbia<br>Calgary, Alberta<br>Winnipeg, Manitoba<br>Brampton, Ontario<br>Burlington, Ontario<br>Weston, Ontario<br>Boucherville, Quebec<br>Montreal, Quebec<br>Dartmouth, Nova Scotia |

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## GLOSSARY OF PRINTING TERMS

**Electrostatic printing**
A process in which original material is reproduced without ink or pressure. One type uses a plate coated with selenium, a substance that conducts electricity when exposed to light.

**Flexography**
A variation of letterpress printing in which rotary web-fed relief presses with rubber or photopolymer plates are used.

**Gravure**
A printing process in which the image plate or cylinder consists of tiny indentations or wells, which hold the ink. In the press, the substrate soaks up ink to form the image.

**Ink-jet printing**
A process whereby small droplets of ink are propelled onto the substrate across a short air gap. The information required to specify the position of the droplets is electronically controlled and provided by a computer-based system.

**Letterpress**
A printing process in which the impression is taken from a raised (relief) inked surface.

**Lithography**
A printing process in which flat plates are used. These plates are produced photomechanically and are chemically prepared so that ink adheres only to the image area.

**Printing press**
A machine that transfers an image from some sort of plate or image carrier to an image receiver.

**Screen printing**
A printing process in which a porous screen is used, where the openings in the areas not to be printed are blocked with a stencil. Ink is applied to the screen and forced through the mesh openings in the areas not protected by the stencil, thus producing the image on the substrate underneath.

**Web press**
A printing press that is fed from a roll of paper (or web) rather than individual sheets.

Printed on paper containing recycled fibres.