



Printing Industry

The printing sector is a diversified industry sector composed of firms who perform printing as well as firms who render services for the printing trade, such as platemaking and bookbinding.

One of the most significant characteristics of the printing industry is the large proportion of very small firms. The Census Bureau reported that in 2002 nearly half of the 37,538 printing companies had fewer than five employees; approximately 80 percent employed fewer than 20 workers.

Processes used in printing include a variety of methods used to transfer an image from a plate, screen, film, or computer file to some medium, such as paper, plastics, metal, textile articles, or wood. The most prominent of these methods is to transfer the image from a plate or screen to the medium (lithographic, gravure, screen, and flexographic printing). A rapidly growing new technology uses a computer file to directly "drive" the printing mechanism to create the image and new electrostatic and other types of equipment (digital or nonimpact printing).

Four Main Segments

The printing industry can be separated into four main segments:

- Lithography
- Flexography
- Gravure
- Screen printing

Lithography

Lithography is a planographic printing system where the image and non-image areas are chemically differentiated with the image area being oil receptive and non-image area water receptive. Ink film from the lithographic plate is transferred to an intermediary surface called a blanket, which, in turn, transfers the ink film to the substrate. Fountain solution is applied to maintain the hydrophilic properties of the non-image area. Ink drying is divided into heatset and non-heatset. Substrate can be fed into the press either as individual sheets or from a continuous roll or web.

Flexography

Flexography routinely prints jobs that we all have contact with on a daily basis in the supermarket, at the warehouse store, at the shopping mall, and at newsstands. This printing process uses a flexible printing plate with a raised image mounted on a rotary cylinder. The liquid and fast-drying ink is applied to the printing plate



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by way of a finely engraved rotary cylinder, called an anilox roll. A flexo press is equipped with one to twelve color stations and can print on virtually any type of substrate, from corrugated board to flexible plastic film or textiles and cloth fabrics.

Gravure

Gravure is an intaglio printing process. Gravure is the simplest of the major printing processes in terms of the number of ink transfers and moving parts. An image carrier has the image cut or etched below the surface of the non-image area. On the gravure image carrier all the images are screened, creating thousands of tiny cells. During printing, the image carrier is immersed in fluid ink. As the image carrier rotates, ink fills the tiny cells that cover the surface of the cylinder. The surface of the cylinder is wiped with a doctor blade, leaving the non-image area clean while ink remains in the recessed cells. Substrate is brought into contact with the image carrier with the help of an impression roll. At the point of contact, ink is drawn out of the cells onto the substrate by capillary action and transferred (printed) on the substrate. The substrate is passed through a dryer where the ink is dried.

Screen Printing

Screen printing is a printing process in which printing ink, coating, or adhesive material is passed through a taut web or fabric to which a refined form of stencil has been applied. The stencil openings determine the form and dimensions of the imprint.

Hazards In Printing

Printing operations and related processes can present a variety of hazards or potential hazards that range from machine guarding/safety and lockout/ tagout to airborne chemical contamination to entry into confined spaces.

In printing and related industries, a variety of chemicals – including alcohols, glues, inks, dyes, cleaners, ammonia, lead, formaldehyde, paper dusts, and many types of solvents – can be found.

In addition, workers involved in printing processes may be at risk of developing musculoskeletal disorders (MSDs) from workplace activities which force them to work outside their physical capacities (i.e., lifting an item that is too heavy, or lifting too often, or working in awkward body postures).



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Environmental Concerns

Printing operations use materials that may adversely affect air, water, and land:

- Certain chemicals involved in printing volatilize, which contributes to air emissions from the facility and to smog formation;
- Other chemicals may be discharged to drains and impact freshwater or marine ecosystems; and
- Solid wastes contribute to the existing local and regional disposal problems.

The printing processes outlined in the previous section have many common wastes; however, they also each have outputs that are process specific.

