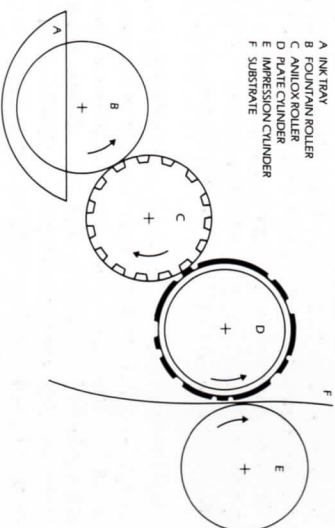


The printing unit (Fig. 5) of all the three types of press has the same basic configuration. A plate cylinder (D) with a fixed gear onto which the flexible printing plates are mounted. A roller (C) (the anilox roll) engraved overall with a pattern of small cells running at the same speed as the plate cylinder, applies a thin film of fast drying liquid ink to the surface of the plate; the ink film thickness being controlled by the volume of the cell, the viscosity and density of the ink itself and by either a rubber roller (B) which runs with a speed differential against the engraved roller or by a steel 'doctor' blade which runs against the surface of the anilox roll. The latter method, particularly when the engraved anilox roll runs in the reverse direction to the angle of the doctor, is now used almost exclusively for high quality work.

Fig. 5



A INK TRAY
B FOUNTAIN ROLLER
C ANILOX ROLLER
D PLATE CYLINDER
E IMPRESSION CYLINDER
F SUBSTRATE

The printing plate

There are three main types of printing plate. The **rubber stereo** whereby the printing plate is moulded from rubber, and where additional plates can be produced at modest cost. This type of plate is used extensively for normal work.

The **photopolymer plate** whereby a film of the printed image is exposed in contact with either a liquid or solid sheet of photopolymeric material, the unexposed non-printing areas are then washed away leaving the printing design proud of the remaining non-printing areas. Most process printing is carried out with this type of printing plate. The use of photopolymer printing plates is growing rapidly.

The **integral roller**. Usually this is a rubber covered roller or sleeve. The non-printing area is removed by a laser beam, leaving the printing surface above the non-printing area. This method produces excellent continuous stripes and designs, and is used extensively in the flexo wallcoverings industry.

Printing Inks. The inks used in flexography are invariably liquid; either solvent or water based. Most solvent inks are based mainly on alcohol when used for flexible packaging work, and are water based for paper sacks etc. In order to retain a consistent viscosity of the alcohol based ink, the addition of solvents on a regular basis is necessary to balance the evaporation of the solvent and thus ensure a consistent colour density. The inks are usually dried by the use of high velocity, high volume hot air blown against the substrate.

Q. What products are printed by flexo?

A. Virtually any substrate can be printed by flexo, from lightweight tissue paper to timplate. In practice, many products such as gift-wrap, wallcovering, labels, plastic bags, frozen food wrappers, confectionery wrappers, bread bags and corrugated cartons are likely to have been flexographically printed. Even newspapers are moving towards flexo, and each day technical developments take place which widen the scope for flexography.

Q. Is there a future in the flexo industry?

A. Most certainly; in flexo, as the fastest growing printing process, there are excellent opportunities for young people who wish to make a career within all branches of the industry.

Q. What should I do to find out more about flexo?

A. The European Flexographic Technical Association is a non-profit making organisation created to promote flexography in the U.K. in 1973. Our membership of over 320 members is made up mainly of printers and their suppliers; also designers, buyers and students of flexography. A library of publications is available. Workshops, seminars and training sessions are held throughout the U.K. at regular intervals, and at the beginning of each year judging of the EFTA Print Awards, open to members and non-members takes place.

If you would like more information about the Association or other aspects of flexography, please contact:

Jack H. Birch, Executive Secretary, EFTA (UK),
6 The Tynings, Clevedon, Avon BS21 7YP.
Telephone: 0275 878090

Eric E. Driver, Technical Manager, EFTA (UK),
21 Rectory Lane, Kings Langley, Herts. WD4 8HA.
Telephone: 0923 264326



EUROPEAN FLEXOGRAPHIC
TECHNICAL ASSOCIATION

A

GUIDE

TO

FLEXOGRAPHIC

PRINTING

An information booklet for
printing students, designers,
artists and buyers

Q. What is flexographic printing?

A. Flexography is a rotary printing process using a liquid ink in conjunction with flexible printing plates. A relief process, the printing surface is raised above the level of the non-printing areas. A liquid ink film is applied to this raised surface usually by means of a roller and the printing plate re-deposits this ink film onto the material to be printed as it passes over a back-up roller called the impression cylinder. Most flexographic printing is carried out reel to reel.

Q. How does this differ from the other main printing processes, offset litho, letterpress, gravure and screen?

A. **Offset lithography** is a planographic process whereby the printing and non-printing areas are on the same plane. The printing and non-printing areas are determined by the basic principle that grease and water reject each other. An oil based ink is applied to the surface of the litho plate - the printing area is compatible with the ink and takes up the ink film. The non-printing areas carry moisture from a dampening system and accordingly rejects the ink film. The litho plate normally transfers (offsets) the ink film to the paper.

Gravure is an intaglio printing process whereby the printing image is very slightly below the surface of the non-printing areas. The design to be printed is etched or engraved onto the surface of the printing roller, the design being broken up into a regular screen, essentially in the form of individual cells. The walls of these cells have two functions, the first being to retain the ink in the minute recesses of specified volume, the second being to support the steel doctor blades which wipe off the surplus ink from the roller surface.

Letterpress is a relief printing process whereby a film of oil based paste ink is applied to the surface being raised above the level of the non-printing areas. It differs from flexographic printing through the use of oil based inks which dry by absorption/oxidation. It is unsuitable for printing non-absorbent substrates and has been largely superseded by offset litho for conventional trade printing and by flexo or gravure for packaging and similar products.

Screen printing is a specialised process whereby an open screen or mesh is used as the printing plate. Printing areas have the open screen and in non-printing areas the screen is closed. A heavy ink film is rolled over the printing plate and the ink is forced through the open sections of the screen to the substrate to be printed. A process capable of giving heavy flat depositions of ink in relation to other printing methods, it is relatively slow in operation.

Q. Where does flexo have advantages over other printing processes?

A. Essentially flexo is a simple printing process with particular advantages as a web printing process. Its advantages over web offset is that it has a variable range of cut-off, i.e. printing rollers with a repeat range of 100-2000mm are possible, although, except for specialist applications like labels and linboard printing, a range of 300-1000mm is more common. For packaging work this gives flexo a tremendous advantage over litho, particularly so when continuous designs are printed, i.e. stripe and solid colours. Gravure can match the versatility of flexo from the variable range of cut-offs. It is capable of an extremely high quality of reproduction, but has a drawback in the time that is required to manufacture the gravure printing cylinder. For short to medium run orders, the cost of the gravure printing cylinders can be a serious handicap.

Flexo, with modest plate costs, a variable cut-off capability, and short manufacturing times offers lower production costs than the other processes. Although theoretically a technically simple printing process, in order to achieve high quality reproduction in a similar way to the other printing processes, a very high degree of control is required at all stages of preparation and production.

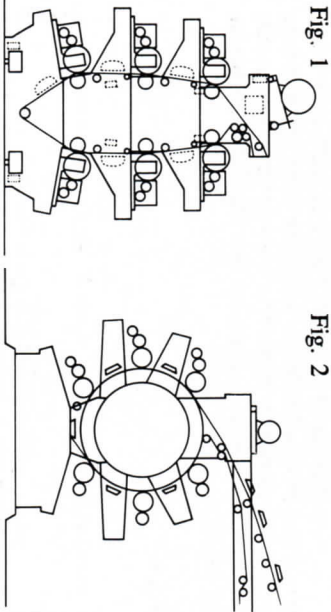


Fig. 1

Fig. 2

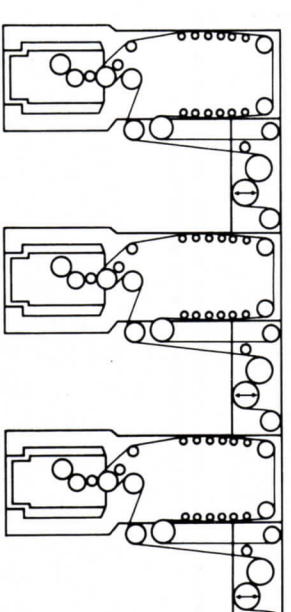


Fig. 3

Q. What does the flexographic printing press look like?

A. There are three different types of flexographic printing press. The **stack press** (Fig. 1) where individual units each have their own impression cylinder, and the printing units are 'stacked' one above the other. The **common impression cylinder press** (Fig. 2) (the C.I. press) has a single large impression cylinder with the units positioned round the cylinder.

The third type is the **in-line press** (Fig. 3) whereby the printing units are positioned in line in a similar way to a gravure press.

Currently most packaging presses are of the C.I. type (Fig. 4) where the substrate is held in close contact with the cylinder as it passes from print unit to print unit and thus this form of construction ensures dot upon dot registration of colours, irrespective of the extensibility of the material being printed. This common impression cylinder is manufactured to extremely high engineering standards; usually it is temperature controlled to 1°C, and has a maximum 'run-out' not exceeding 10 microns. By their very nature these presses are expensive and are available with up to eight printing units. The stack press cannot hold register between colours on extensible substrates to the same degree of accuracy, although it is still widely used in many parts of flexographic printing, particularly as part of another production process like bag making. The in-line press is used mainly for specialised applications where very high speeds are required, and the drying capacity of the C.I. press would be sufficient.

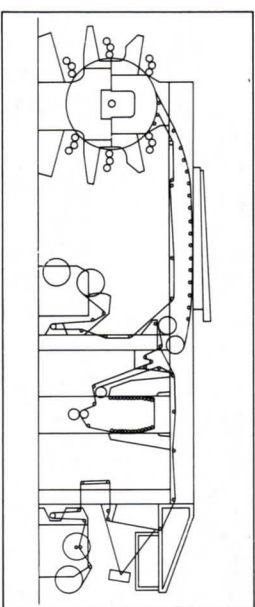


Fig. 4