



印刷概论

Printing Brief introduction

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PRESS

- Relief / Flexo / Letterpress Printing
- Gravure Printing
- Screen Printing
- Lithography / Offset Printing
- DI Technology
- Non-Impact Printing
- Comparison of Printing Technologies
- Inline Finishing

Gravure Printing

- Introduction
- Printing unite
- Substrates
- Presses
- Special features

Introduction



Intaglio print



Intaglio print (stylus)



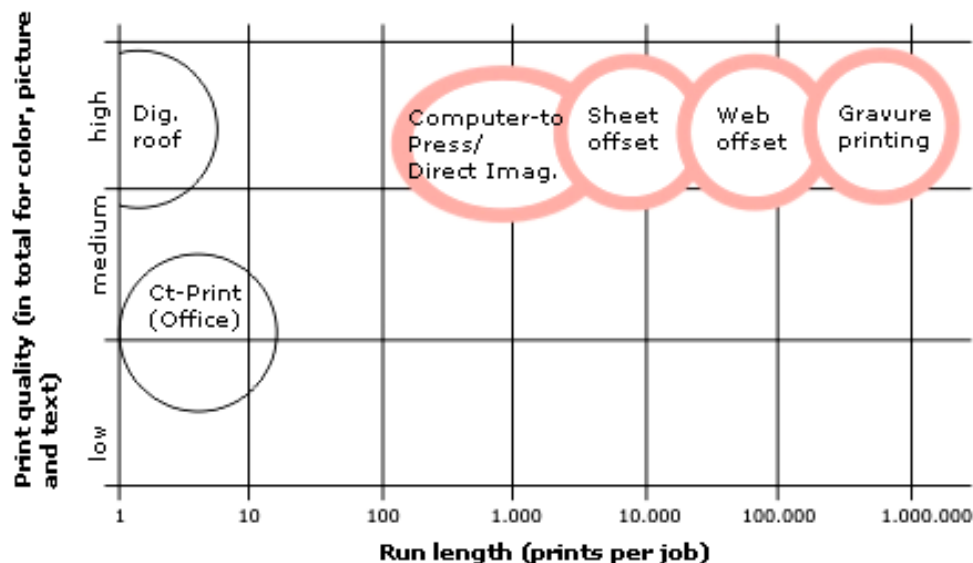
Copperplate cylinder

This section is all about gravure printing. Gravure printing is a direct descendent of the very old intaglio printing process, whose origins go back to the early 15th century in the form of copperplate engravings.

Centuries later in 1878 the Bohemian artist, Karl Klietsch, developed heliogravure. These heliogravures made it relatively easy to

produce engraved plates. Gravure printing offers very smooth color transitions, subtly distinguished strong color depths and produces prints that are true to the original in long print runs. Gravure printing currently has a market share of about 15% among all printing technologies, although it is showing a slight downward tendency.





Printing quality under the aspect of run length



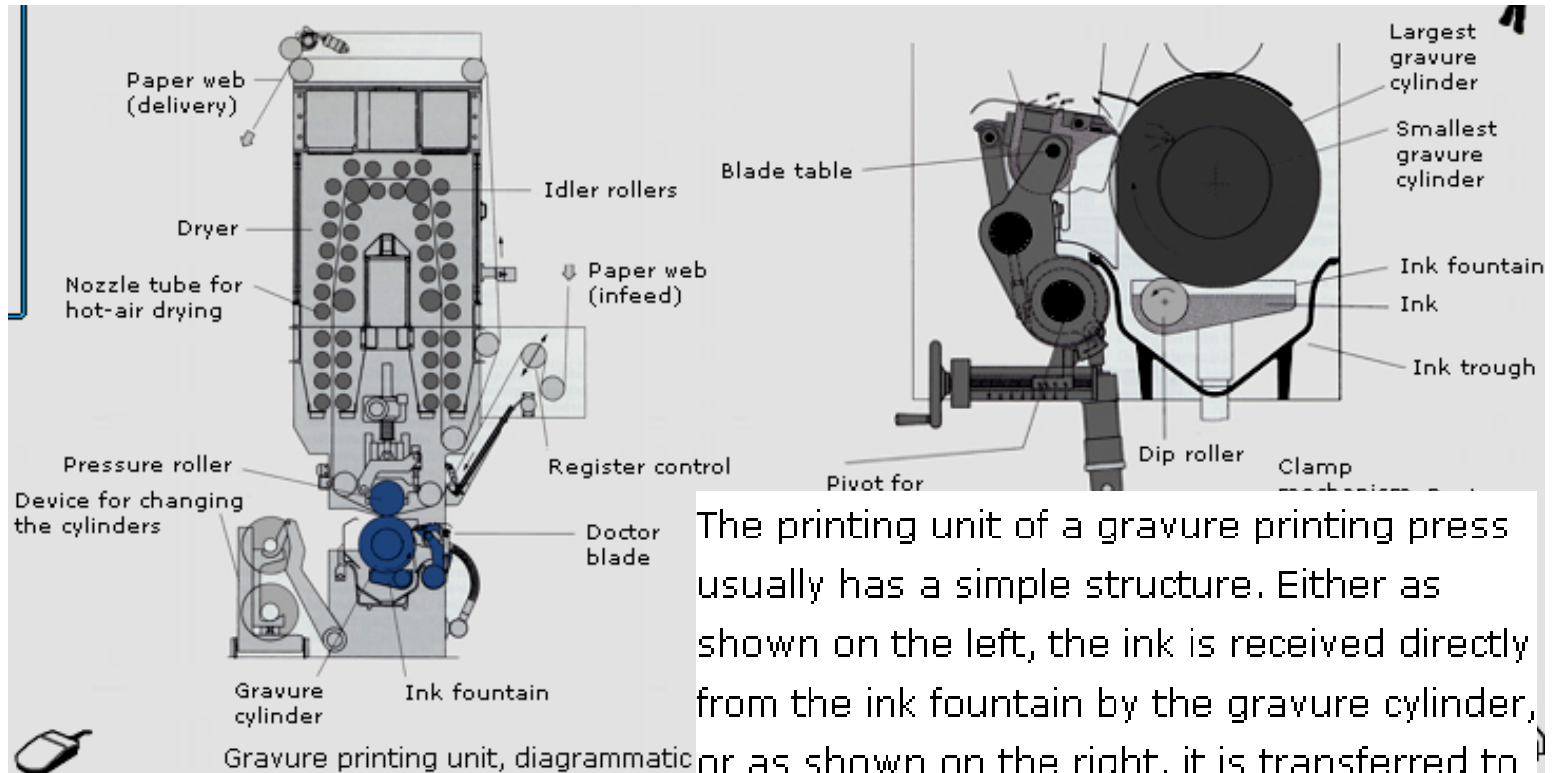
Gravure-printed products

Gravure printing is only used for long print runs because it is very time and cost-intensive to produce the image-carrier, i.e. the gravure cylinder. The minimum run length is about 500,000 copies. Gravure printing typically produces high-quality print

products such as catalogs, newspapers, securities, postage stamps and also printed plastic and metal foils. The process of manufacturing the gravure cylinder is explained in the prepress section.

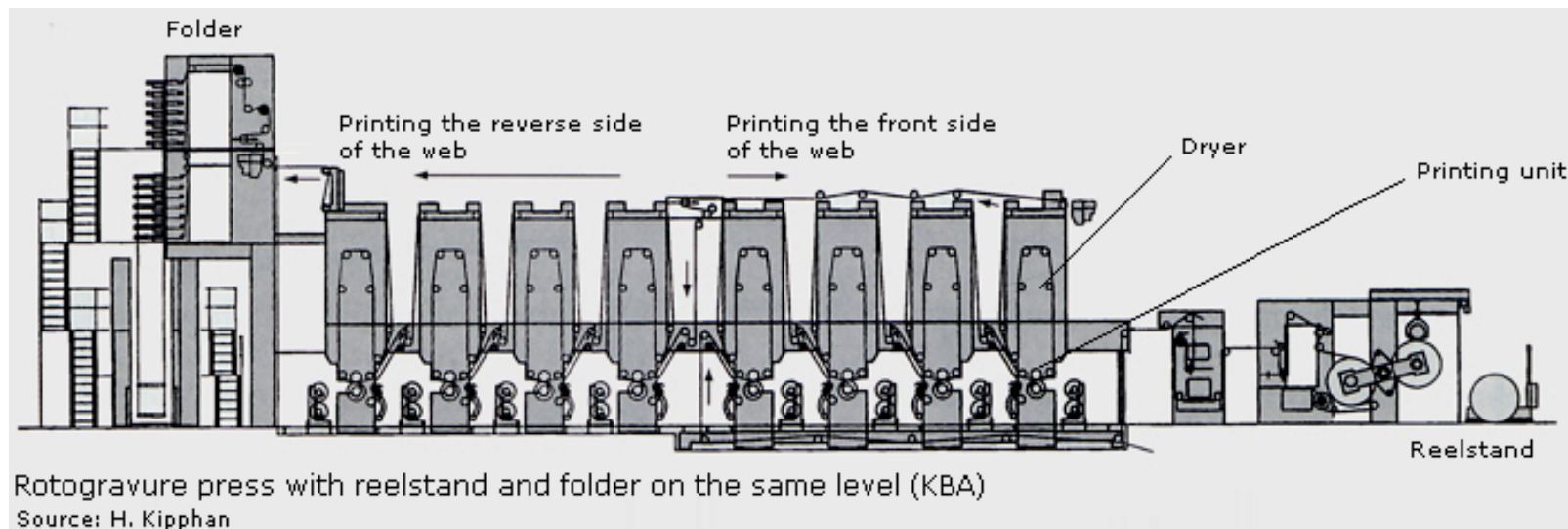


Printing unite



The printing unit of a gravure printing press usually has a simple structure. Either as shown on the left, the ink is received directly from the ink fountain by the gravure cylinder, or as shown on the right, it is transferred to the gravure cylinder using a transfer roller.





This is the diagram of a gravure printing press with eight printing units. On the right you can see the unwinding unit, and on the left the open sheet delivery.





Gravure press in operation

Substrates



Gravure-printed products



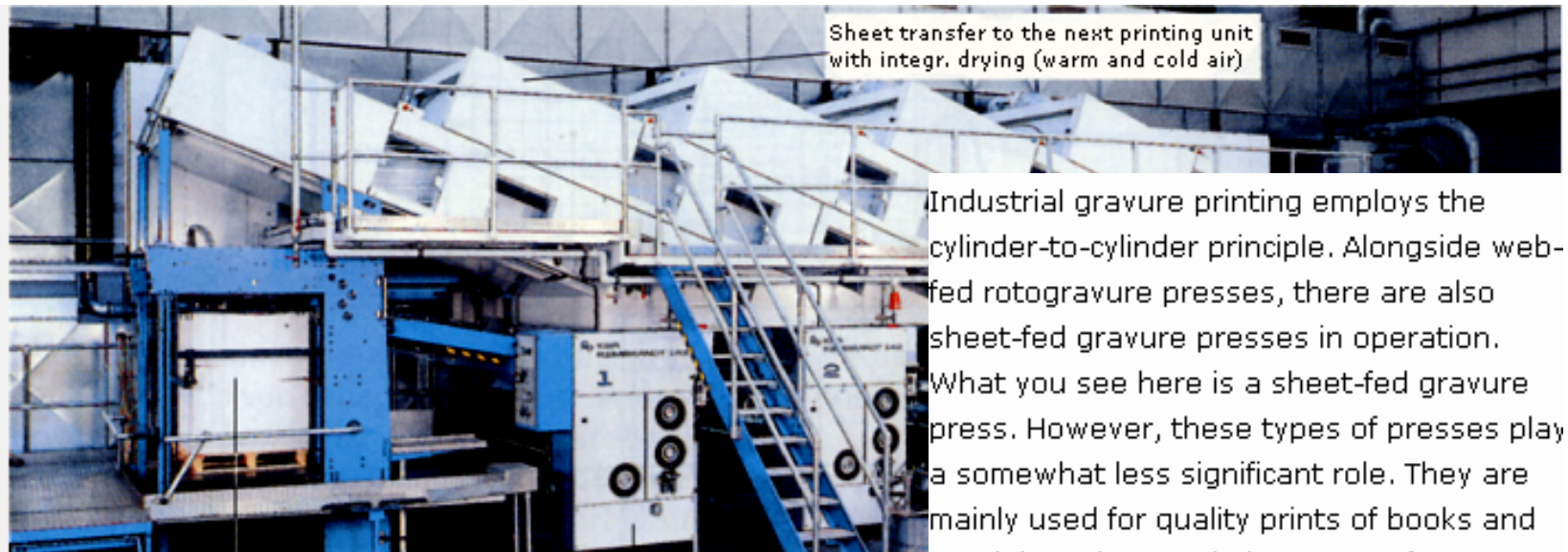
Gravure-printed packaging products

A large variety of substrates can be printed using gravure technology. Rough, uneven surfaces and corrugated board, however, are not suitable for gravure printing. It is

mostly paper, light cardboard, plastic and metal foils with a weight of around 50 grams -120 grams per square meter that are processed.



Presses



Sheet transfer to the next printing unit with integr. drying (warm and cold air)

Sheet delivery

Printing unit

Multi-color sheet-fed gravure press for packaging printing (KBA)

Source: H. Kipphan

Industrial gravure printing employs the cylinder-to-cylinder principle. Alongside web-fed rotogravure presses, there are also sheet-fed gravure presses in operation. What you see here is a sheet-fed gravure press. However, these types of presses play a somewhat less significant role. They are mainly used for quality prints of books and special catalogs and also as proof presses for jobs to be produced on rotogravure presses. Sheet-fed gravure presses cannot reach the speed of rotogravure presses, which makes them rather uneconomical for the typically long runs produced in gravure printing.



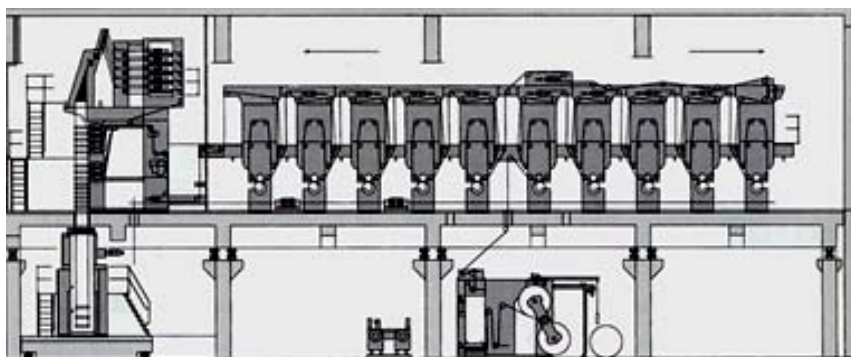


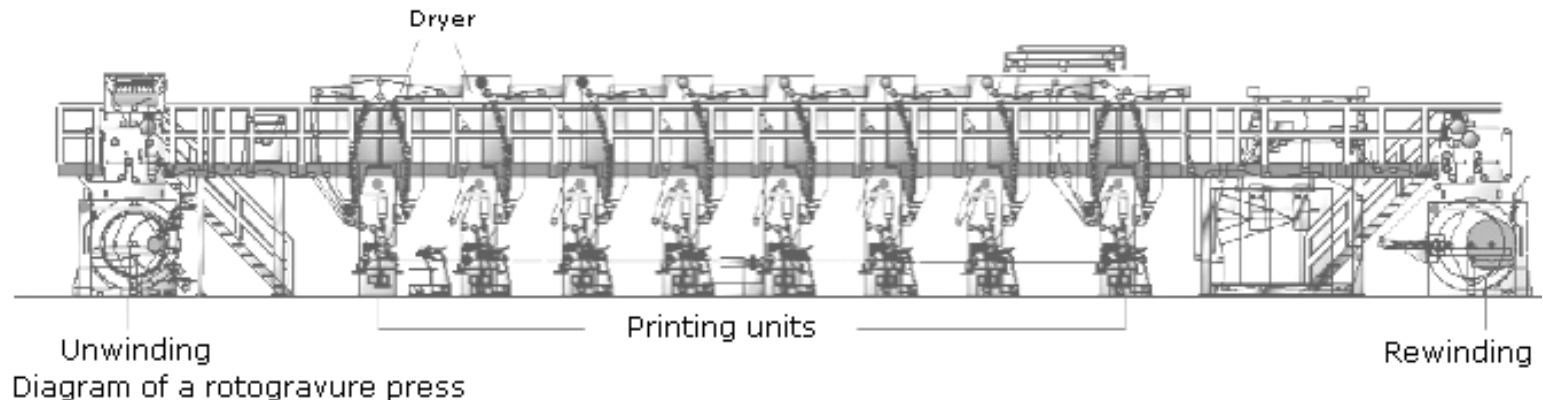
Diagram of a rotogravure press for illustration printing



Rotogravure press for packaging printing (W&H)

Rotogravure presses are predominant in the industrial production of print media products. The presses are used to print format widths of between 60 cm and 350 cm.

Special features



Gravure printing is the only printing technology that can print continuous tones. Accordingly products printed with gravure presses have the best image quality and brilliance in comparison to other printing technologies. The simplicity of the printing unit enables fast and reliable setting of the ink. Take a moment to look at its functions and special features.





The gravure printing process allows high press speeds, up to 16 meters per second. At present no other printing technology can achieve this with the same quality.





Gravure printing allows light grammages to be printed at high speed in high-quality.





The gravure cylinder has very long print-run durability, which can be up to 5 million copies.



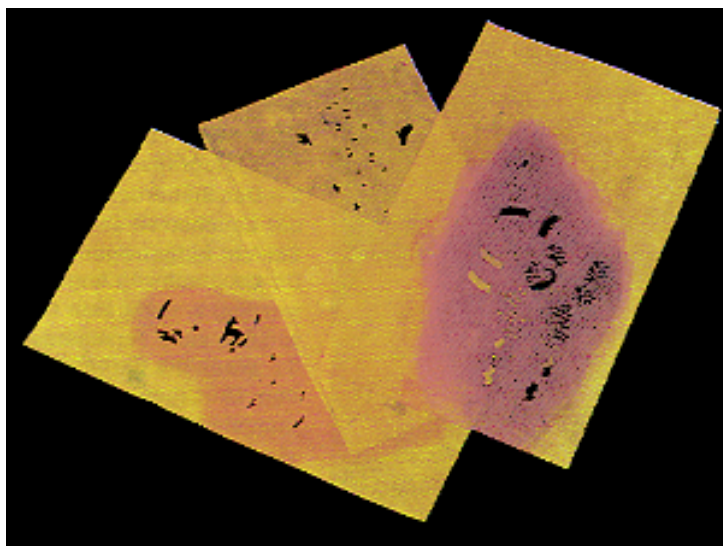


The high cost and the time required for manufacturing the gravure cylinder are drawbacks of this technology. Thus, short runs under 500,000 copies cannot be produced economically with rotogravure printing.



Screen Printing

- Introduction
- Substrates
- Press
- Special features



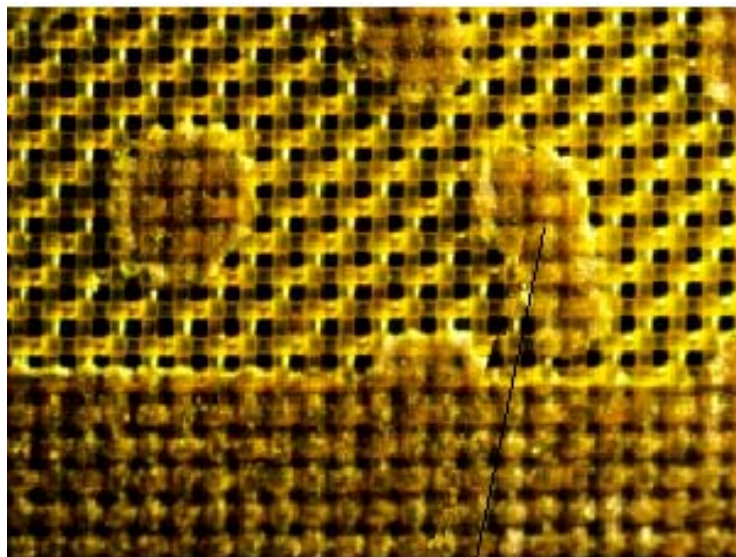
Stencil for screen printing



Screen-printed product

Screen printing or serigraphy is a printing process with a wide array of applications. The principle of screen printing might be older than that of letterpress. Screen printing originated in modern China. Originally this method was used to print textiles. In 1930 the process was rediscovered and it has been continually developed since then.





Screen fabric with stencil

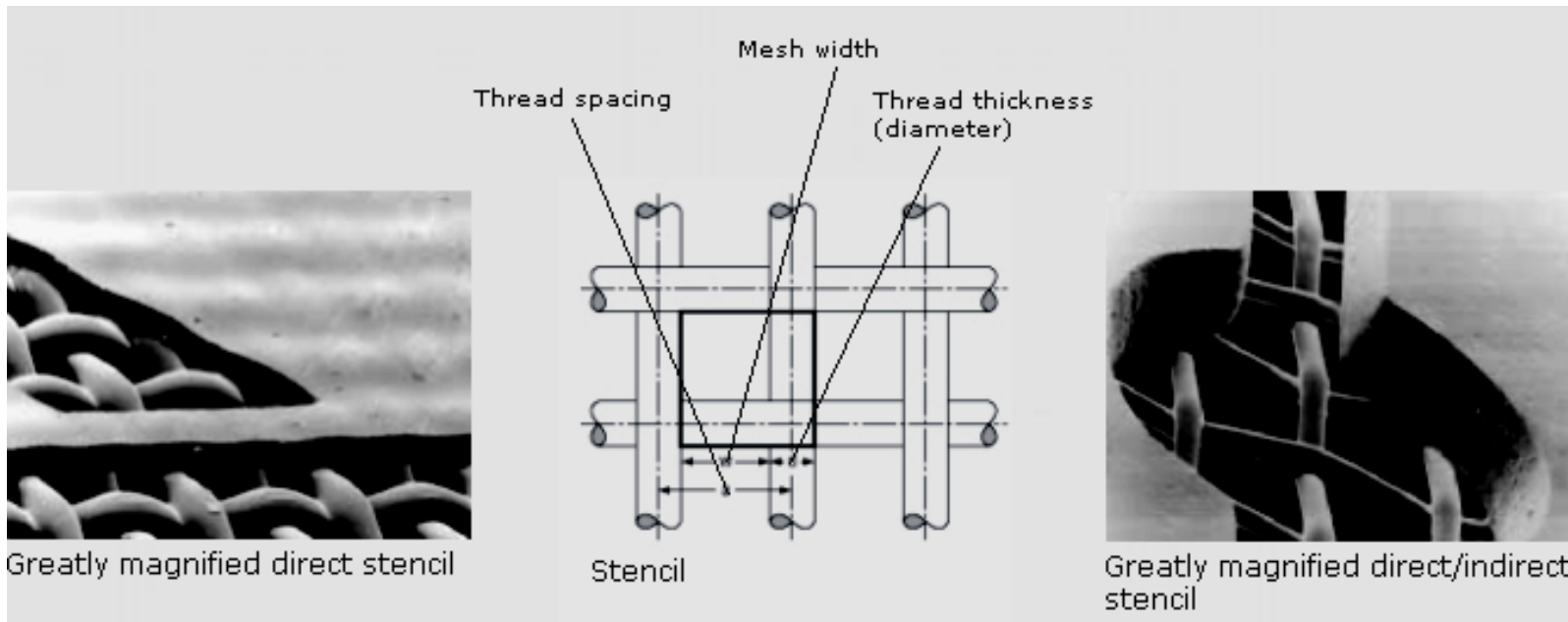
Non-permeable area



Halftone dots of the three-color screen print

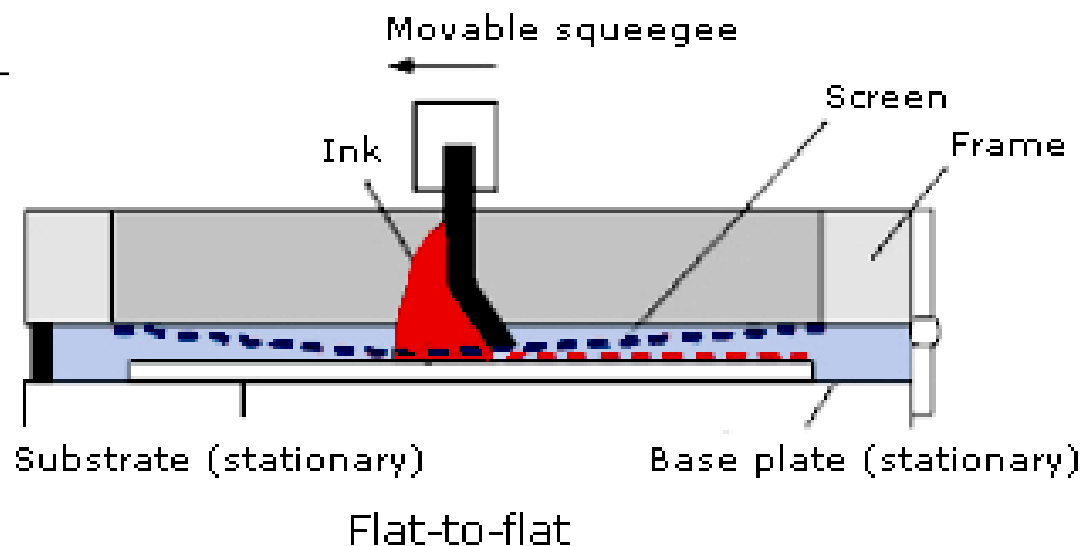
In screen printing the ink is forced through a mesh, which holds a stencil. The stencil contains the image information in the form of areas that are permeable or non-permeable to ink.





The threads of the mesh vary in thickness depending on the screen fabric. The fabrics contain between 10 and 200 threads per cm. There are usually 90 to 120 threads per cm. For halftone prints produced using the screen printing technique, one could say as a guiding principle, that the number of threads is three to four times greater than the screening of the printed image.

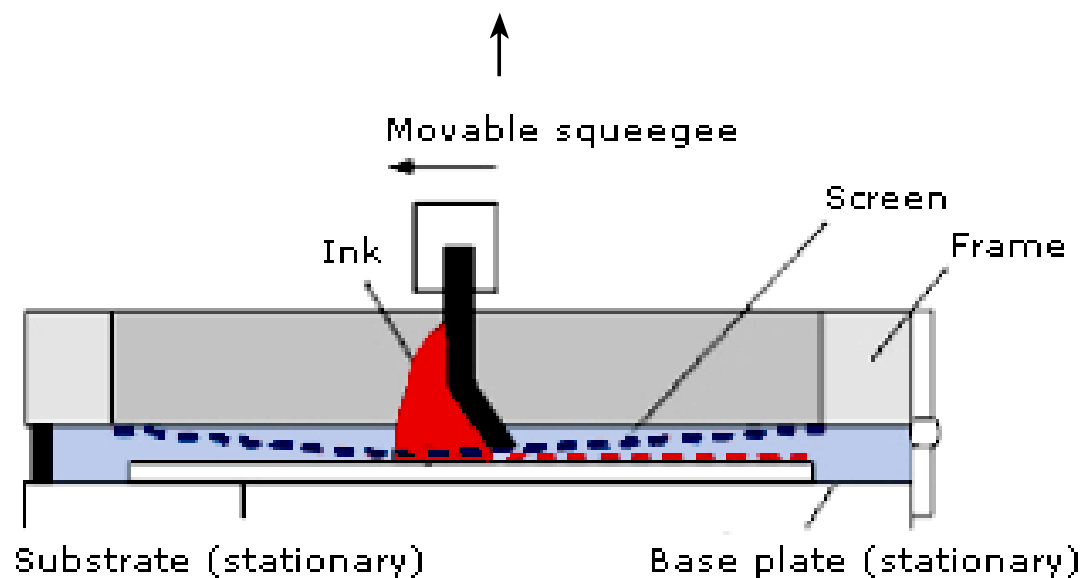




In screen printing there are the three principles of flat-to-flat, flat-to-round and round-to-round.

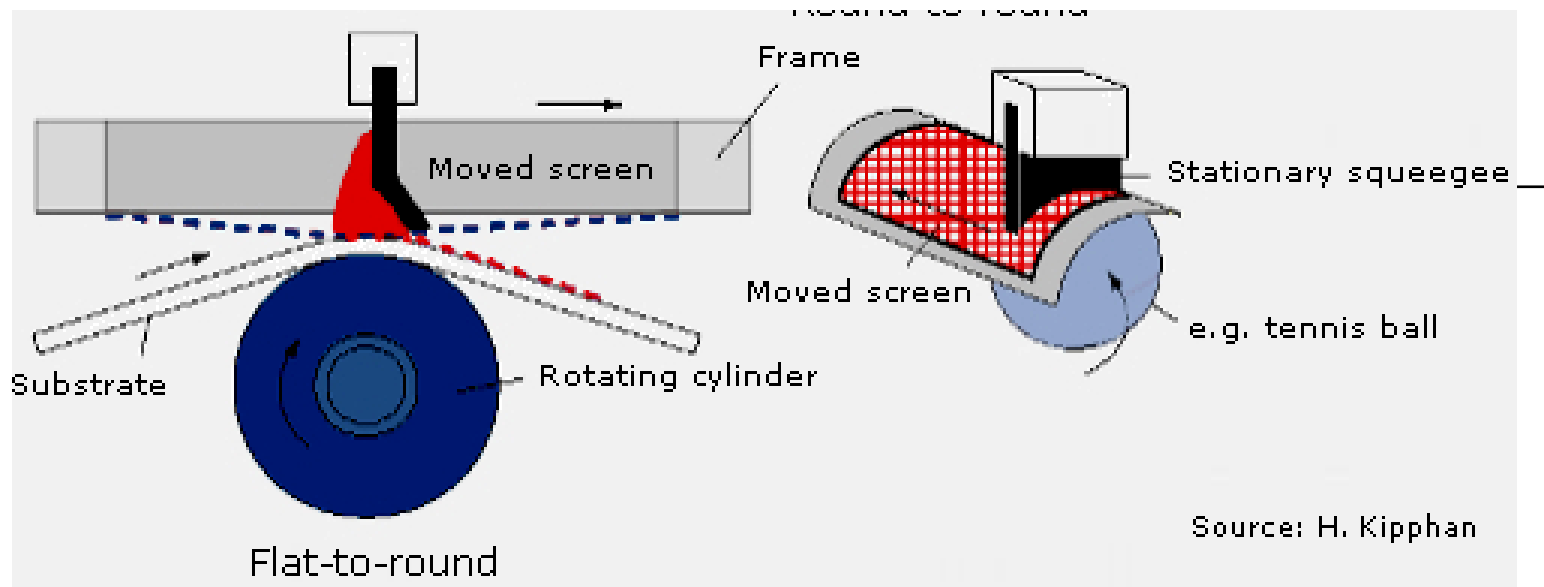


With the flat-to-flat principle the substrate and the mesh are stationary, while the squeegee presses the ink through the mesh openings onto the substrate.



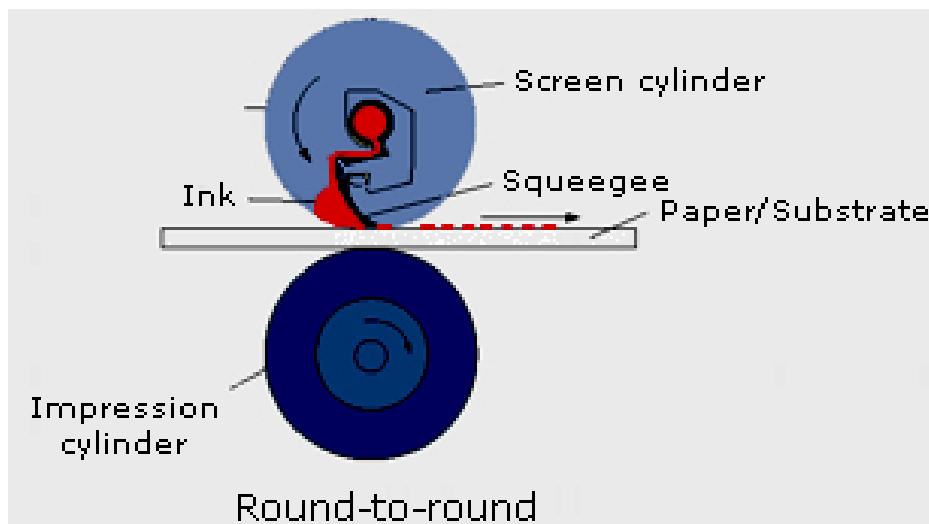
Flat-to-flat





With the flat-to-round principle, also known as geometric printing, the squeegee is stationary and the substrate moves with the sieve. The rotating cylinder functions as an impression cylinder.





With the round-to-round principle, also known as rotary screen printing, the squeegee and the ink-supply are installed in a fixed position in the inside of the cylindrical screen mesh. The substrate passes between the impression cylinder and the screen cylinder. This enables seamless printing using a rotary sieve.



Substrates



Textiles



Toys



Bottles and glasses

Source: H. Kipphan

In screen printing almost all materials and shapes can be printed. The application area ranges from CDs to textiles, and electronic printed circuit boards to curved surfaces such as toys, bottles, drinking glasses etc.



Press



Multi-color screen printing machine for bottles



Multi-color screen printing machine

There are different press configurations utilized for the various applications in screen printing. You can see some examples here.

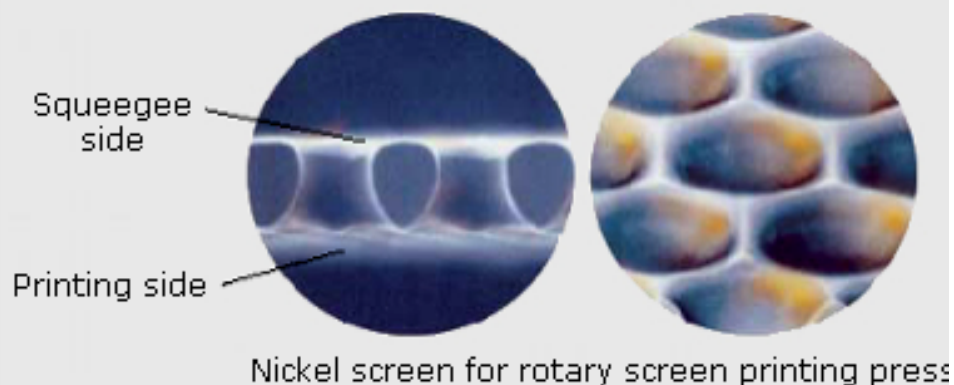




Rotary screen printing forms



Mounting a flat screen for rotary screen printing



Source: H. Kipphan

This is a rotary screen printing press. The cylindrical sieves can be produced without seams.





Semi-automatic screen printing table
(Siri/Steinmann)



Screen printing table
(Siri/Steinmann)

These presses are suitable for printing flat substrates.





Screen printing machine for T-Shirts
(Siri/Steinmann)

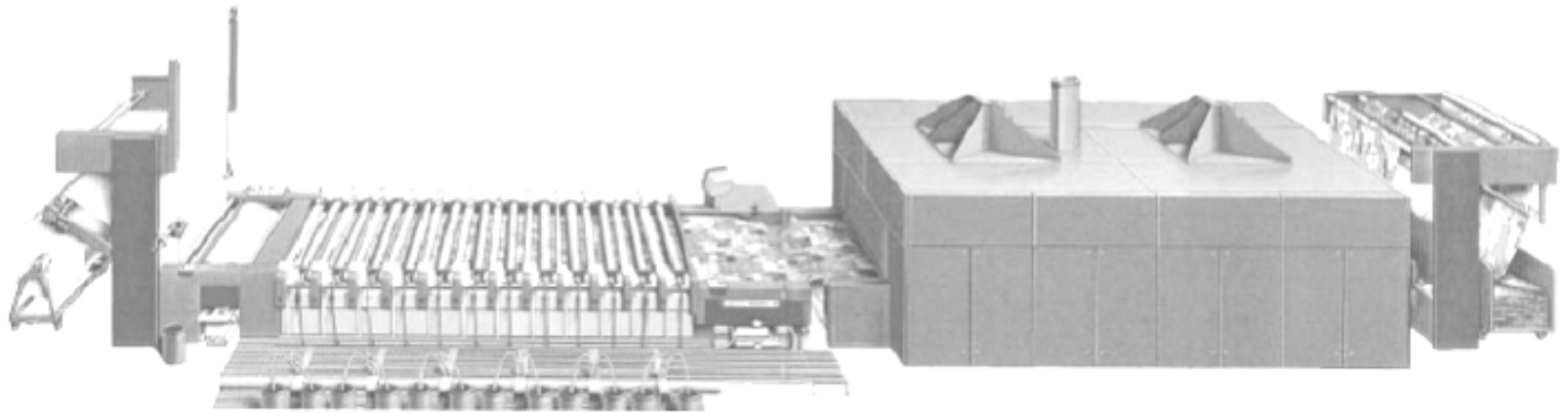


Screen printing machine for cups
(RokuPrint/Steinmann)

The machine on the left prints t-shirts, the machine on the right prints cups.



Special features



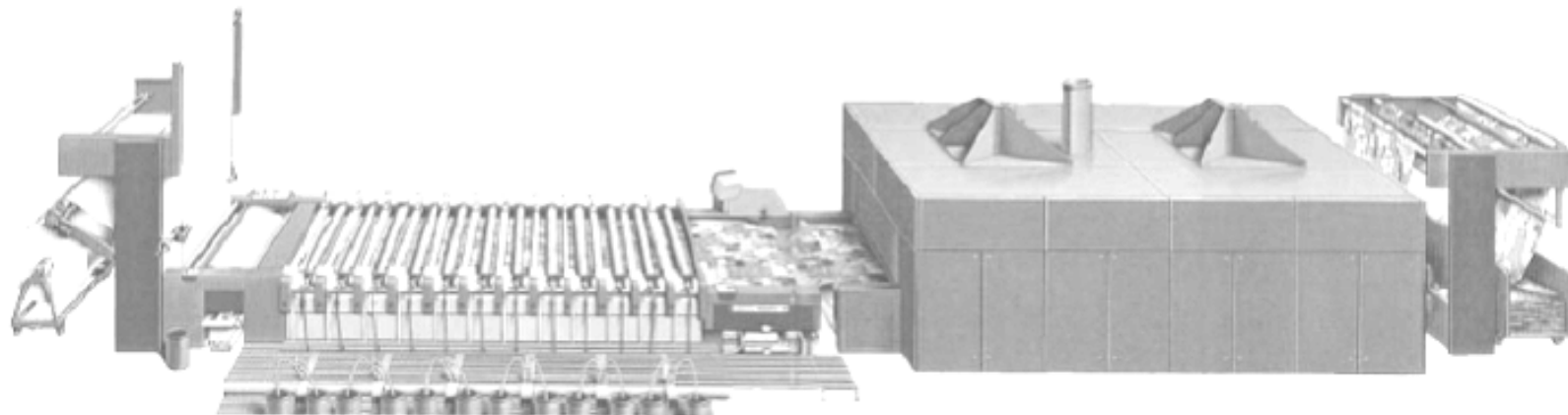
Screen printing system for multi-color textile printing

Screen printing is the printing process with which practically any substrate, even non-flat surfaces like cups, t-shirts and glasses, can be printed. We have listed a few characteristics and features here.





The printed inks are especially vivid and lightfast. This is due to the controllable ink layer thickness, which can be some 10 to 20 times greater than in lithographic, letterpress or gravure printing. The maximum screen ruling is 60 lines per cm.

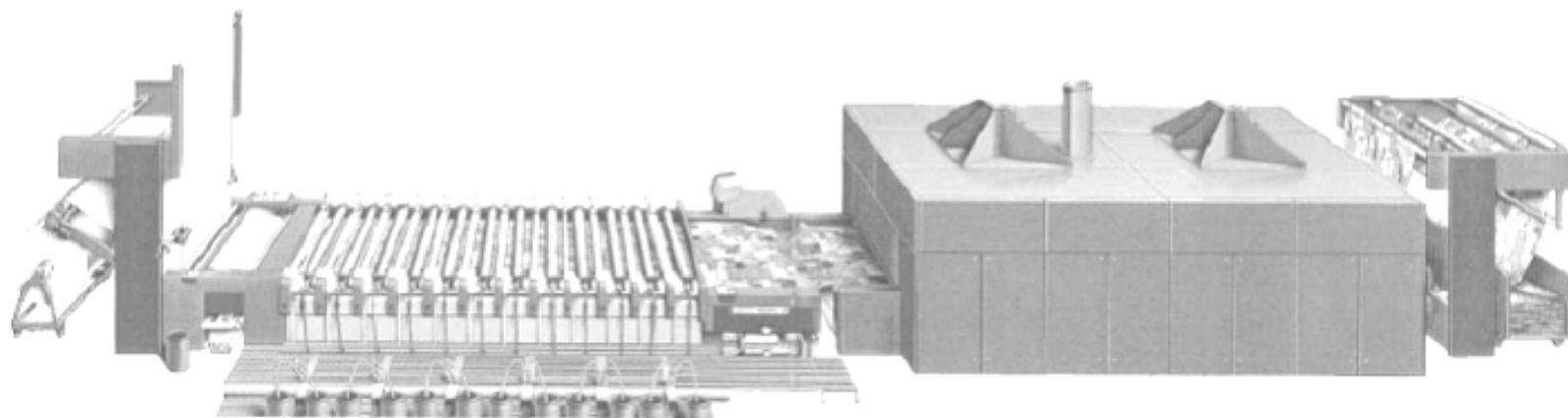


Screen printing system for multi-color textile printing

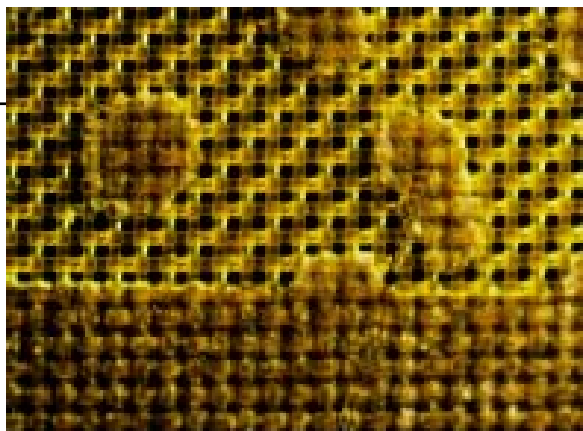




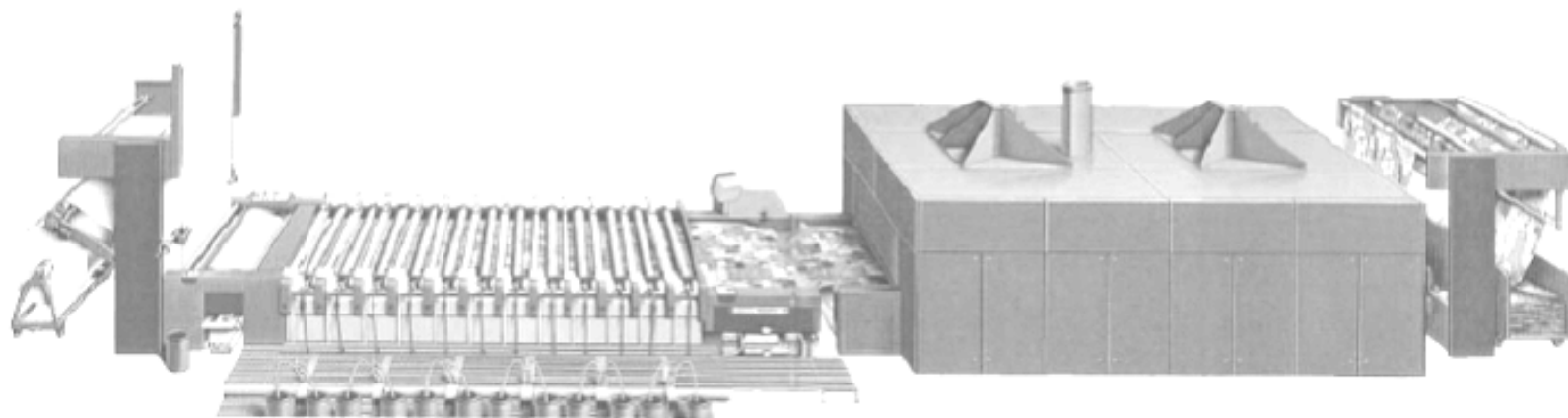
At the moment screen printing is more economical for shorter runs, although the production of longer runs is becoming more and more economical.



Screen printing system for multi-color textile printing



The maximum screen ruling is 60 lines per cm.



Screen printing system for multi-color textile printing

