Description

Process schematic

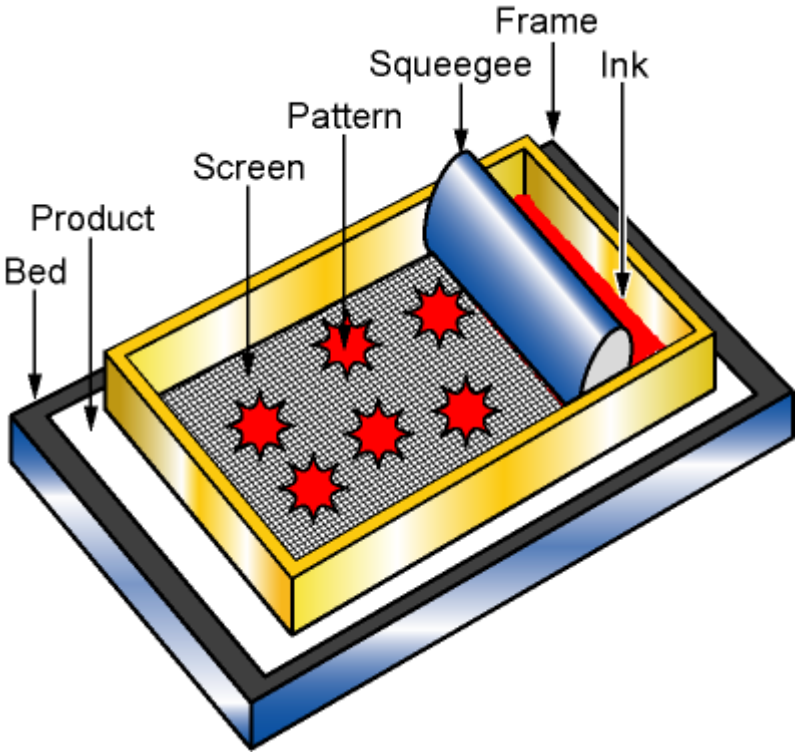

Figure caption

Silk screen printing: ink is squeejeed across a silk screen with a stencil attached.
Ink is forced through the holes in the stencil onto the product.

The process

SILK SCREEN PRINTING has its origins in Japanese stenciling, but the process that we know today stems from patents taken out by Samuel Simon of Manchester at the turn of the century. He used silk stretched on frames to support hand painted stencils, a process also used by William Morris to create his famous wallpapers and textile prints. During the First World War in America screen printing took off as an industrial printing process; but it was the invention of the photographic stencil in the 1930s that revolutionized the process. It is now a $5 billion per year industry.

Material compatibility

Composites	✓
Foams	✓
Glasses	✓
Metals - ferrous	✓
Metals - non-ferrous	✓
Natural materials	✓
Polymers - thermoplastics	✓
Polymers - thermosets	✓

Function of treatment

Thermal conduction	✓
Decoration	✓
Color	✓
Reflectivity	✓

Economic compatibility

Relative tooling cost	low
Relative equipment cost	low
Labor intensity	low

Physical and quality attributes

Surface roughness (A=v. smooth)	B			
Curved surface coverage	Poor			
Coating thickness	0.394	-	3.94	mil
Surface hardness	5	-	10	Vickers
Processing temperature	80.3	-	116	°F

Process characteristics

Discrete	✓

Supporting information

Design guidelines

The process can be applied to polymers, glass, metals, wood, textiles and of course paper and board. Flat and cylindrical objects can be printed. Multiple colors can be printed, but each requires a separate screen.

Technical notes

The screen is a wooden or aluminum frame with a fine silk or nylon mesh stretched over it. The mesh is coated with a light sensitive emulsion or film, which - when dry - blocks the holes in the mesh. The film is exposed to the image or pattern to be printed using ultra-violet light, hardening it where exposed. The screen is washed, removing the emulsion where it was not hardened, leaving an open stencil of the image that was printed onto it. The screen is fitted on the press, the product to be printed is placed under the screen, and the topside of the screen is flooded with ink. A rubber blade gripped in a wooden or metal handle called a squeegee (not unlike a giant windscreen wiper) is pulled across the top of the screen; it pushes the ink through the mesh onto the surface of the product. To repeat the process the squeegee floods the screen again with a return stroke before printing the next impression. Epoxy inks give protection against scratching and can be used with products that attack standard enamel inks.

Typical uses

Posters, stickers, ticketing, shelf strips, banners, exhibition panels, ring binders, mouse-mats, site boards, signs, T-shirts, control panels and badges for computers.

The economics

The capital cost of the equipment is low. The process is economic for small runs and one-color printing. Each additional color adds to the cost because it is applied separately, and requires registration.

The environment

The chemicals, particularly the cleaning fluids, can be volatile and toxic, requiring good ventilation and operator protection.

Links

MaterialUniverse

Reference