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## **VARIABLE SLEEVE OFFSET PRINTING WITH EB CURED INKS**

Web offset lithography refers to the offset printing process compared to the flexographic and rotogravure methods of printing. Offset printing has always been synonymous with high-end commercial printing and has only recently become associated with the packaging industry. Offset technology reduces cost and adds quality compared to other printing formats. Offset quality is comparable to rotogravure printing, which to date has been perceived as the benchmark for quality for package printing applications.

The cost of gravure cylinders can be prohibitively expensive in the retail environment where frequent copy changes are necessary for labeling and promotional requirements. Conversely, offset formats enjoy virtually instantaneous and relatively inexpensive artwork modifications compared to costly and lengthy lead-time requirements associated with gravure or even that of flexo formats. Indeed, offset is peerless in terms of “time to market”.

Offset quality is also far superior to industry standard flexographic printing in terms of line screens, color control, registration, and dot gain constraints. Line screen values of 175-200 are readily achievable with offset printing compared to flexographic, which is typically standardized far below 150 lines per inch (customarily 133 and even lower). Comparatively, offset printing results in high definition and lifelike images.

Offset printing gets its name from the fact that the image is printed on a compressible blanket from a lithographic plate and then transferred to a given substrate (versus directly to substrate via polymer plate or engraved cylinder). Although capable of far more finishing capabilities, offset printing is easily capable of printing roll to roll on either paper or film substrates.

Each offset print unit (or station) houses a printing plate which carries the image necessary for the specific color and design being printed. Each plate possesses an image area that will carry ink and a non-image area that will carry water and repel ink. Each plate is made from a computer file “separated” so each color is contained in its own plate/print unit. Direct to plate technology is utilized to eliminate the step of creating negatives prior to making plates as is done in conventional plate making systems.

Each plate is mounted on a sleeve/cylinder the diameter of the desired print repeat or length of impression. A corresponding compressible blanket sleeve/cylinder is also mounted for each plate to enable the “offset” process. The image area of the plate carries ink from ink rollers and the non-image area water from a water roller (which repels ink) to the to the plate. The ink/water emulsion contained on the printing plate is then transferred to the compressible blanket and from the blanket to the substrate (squeezed between the blanket and an impression cylinder). This sleeve/cylinder mounting system allows for fast changeovers between jobs.

Using the primary colors of process printing, CMYK (cyan, magenta, yellow and black) or 4/C, along with up to 3 spot colors, the finished product will appear to contain myriad colors, even photographic in appearance. Although many colors are readily reproduced as a result of 4/C printing, additional spot (or

PMS/TOYO/Special) colors can be implemented to achieve color variations or effects required by the customer (for logos etc.).

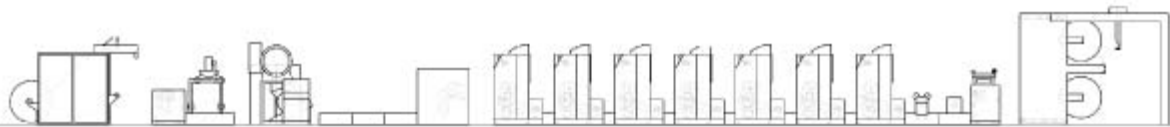
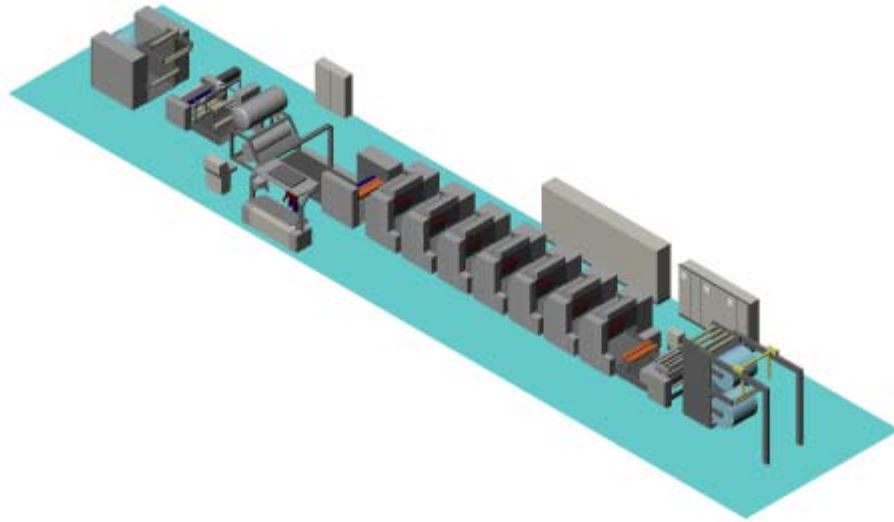
Registration has an effect on the end result. Registration refers to how one color is positioned relative to another. Proper registration is critical in achieving high quality process printing. Slight imperfections in registration may result in blurred or off-color images. Web offset printing utilizes technologically advanced registration guidance control systems capable of not only monitoring, but correcting programmable registration tolerances.

Myriad coating applications also abound in EB offset applications; gloss/matte, low/high slide (COF), even opaque white in spot or overall reverse printed films.

EB offset inks/coatings are cured using electron beam curing technology. Electrons are generated by current on a filament and these electrons trigger a reaction that causes acrylate materials in the ink to polymerize. Expensive photo initiators are not required in EB curing but are required in ultra violet (UV) curing. Nitrogen is used during the EB curing process to create an oxygen free environment. Oxygen inhibits the polymerization process so the cure area must be inert. Much less heat is generated during EB curing than in UV curing. EB curing is also more thorough and less variable than UV curing and creates complete cross-linking for more instantaneous and thorough cure.

Offset has few limitations, but two might include massive solid ink coverage areas and plate-breaks. For example, a plate break may require artwork to account for the non-print area where the ends of the offset plate meet (if significant ink-coverage/artwork were to exist in this 1/4" lateral space). This can be compensated for by covering the break area with a corresponding spot color or preferably by revising artwork to allow for gradation or additional design theories. Early design stage involvement by an offset specialist can assist in achieving the desired final product.

For high quality printing with low cost modifications, Variable Sleeve Offset Printing sets not only a new standard but indeed a very high-bar.



Specifications VSOP 1250 for flexible packaging

Flying splice turret unwinder

7 offset units

EB-curing

Gravure printing unit

Flying splice turret rewinder