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Inks

Offset inks are petroleum-based. If designed specifically for uncoated paper, they produce excellent color because they are formulated with the proper tack to provide good surface holdout and sharp dot structure.

The proper tack of an ink reduces the tendency to “pick”, or pull fibers from the paper’s surface and deposit them on the blanket, creating white specs in the print where they may remain for the rest of the run.

Proper tack also means proper tack sequence, which ensures that, as the inks are laid down one by one, they will trap or adhere to one another. If they do not, colors will be off and may vary considerably from those you wish to match. Severely deficient trapping can also cause uneven or splotchy solids. Typically, the first ink down has the highest tack, followed by the second ink down and so on.

“Good surface holdout” means that a high percentage of the ink’s pigment is retained on the paper’s surface rather than being drawn into its body. Although holdout contributes to slower setting, it’s a desirable trade-off.

TIP:

- Uncoated paper normally needs more drying time than coated paper. Stacks should be kept small to discourage offsetting.
  Offsetting, also known as set-off, occurs when wet ink transfers or marks the back of the next sheet.
- Inks made with Reflex blue take a longer time to dry.
  Review with your ink supplier.

Generally speaking, UV inks share the same physical and optical properties as conventional inks required by the printing process. They differ, however, in the mechanism by which they dry. Conventional inks dry by one or more of the following means: absorption, oxidation/polymerization through exposure to oxygen and evaporation of solvent from the ink vehicle. These mechanisms require time from several seconds to several hours.

UV is an abbreviation for Ultra-Violet, and is a reference to the means by which these inks dry. When exposed to intense ultra-violet radiation (light) the inks undergo a rapid chemical reaction called polymerization. In less than a second, the ink film is dry with good chemical and abrasion

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resistance. The materials used to formulate UV inks must be reactive with ultra-violet light and thus are different than the materials used in conventional ink formulation. As most or all of the ink components react when exposed to sufficient UV light, there are few residual volatile materials that can be emitted from the dried ink film. This can be an important environmental consideration.

An interesting technique involves using "raised" UV inks. This is the piling of UV varnish in specific areas using a flexographic plate mounted on the offset press. When exposed to the UV light, the varnish is hardened instantly. The effect mimics thermography.

A recent development in UV technology is the introduction of "hybrid" inks. UV reactive components have been incorporated into conventional sheetfed lithographic inks. These inks can be run with most blankets, rollers and fountain solutions and do not require the installation of interdeck drying units. Rather, a single or double interdeck drying unit is mounted after the last printing unit, and an additional unit is installed after a UV tower coater. This development allows a printer to benefit from most of the advantages of UV technology with less capital investment and specialized materials. Like traditional UV materials, hybrid inks are more costly than conventional inks.

UV INKS' BENEFITS CAN INCLUDE:

- Low or no VOC (volatile organic compound) emissions
- Nearly instantaneous drying
  - Dry trapping (when inter-unit drying is used)
  - Elimination of scuffing, marking, set-off
  - No density dryback associated with ink drying
- Good chemical and abrasion resistance
- Printed sheets can be immediately re-printed or converted resulting in less inventory on the floor and faster turn-around
- Less waste
- High productivity
- Saturation reduction

Benefits that may be more apparent when used with uncoated paper include: the elimination of density dryback (the change in density or finish of an ink film as it dries), saturation reduction that occurs when ink vehicle is absorbed during the drying process, and the potential for lower dot gain. The latter is dependent on the individual ink formulation and printing conditions.

When successfully implemented, the only "disadvantage" that the customer may experience is cost. If, however, the printer can realize the productivity and waste benefits mentioned earlier, the higher cost of UV inks and the capital associated with additional equipment installation and maintenance may be offset.

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Today, riding a wave of environmental concern, “green” inks have made a comeback. In their chemistry, soy or other vegetable oils replace up to 20% of the petroleum components, depending on whether an ink is formulated for heat set web operations or sheetfed. In either case, there are fewer organic compounds to burn off or evaporate into the atmosphere.

Furthermore, vegetable oils are derived from renewable resources: they are highly compatible with recycled papers and non-alcohol fountain solutions; and they submit easily to de-inking and to bacteria in landfills.

The printing characteristics of vegetable inks offer real benefits to users of uncoated paper, for these inks have better surface holdout, which results in better color and less dot gain. Furthermore, their lower tack and longer drying times can help to reduce mottle in areas with heavy coverage.

TIP:

- Soy inks are less tacky and wetter, so they work well for solids.

For colors that are brighter than can be obtained with conventional petroleum or vegetable-based inks, it’s possible to use a touch (or more) of fluorescence. Fluorescent ink appears to reflect two or three times as much light as conventional ink and produces cleaner, more vibrant colors.

Fluorescent ink can be substituted for one or more conventional inks or, just to give them more punch, it can be mixed with the conventional ink (up to a 50/50 combination). Fluorescents can also help to build ink opacity, which intensifies color on uncoated stock.

Fluorescents do have a couple of practical shortcomings, however. Because they reduce ink density, they make trapping somewhat more difficult. And if exposed to light, over time they fade. Additionally, the impact of the fluorescent ink will depend on the UV content of the viewing light source.

Metallic inks contain actual metallic particles in a varnish base. The contrast between metallic ink and uncoated paper can be striking.

To sharpen up an uncoated surface using metallic inks, choose a well-formed paper with good ink holdout to maximize shine and minimize dryback. Make sure to allow for drying time.

In order to protect metallic ink’s surface qualities, you might choose to apply a matte or dull varnish. This will help prevent tarnishing or scuffing of the metal.

TIP:

- Use metallics to warm up a duotone, or to make a metal object appear lifelike.

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PANTONE, Inc. is a provider of color systems for the selection and accurate communication of color. The PANTONE® name is known worldwide as the standard language for color communication from designer to manufacturer to retailer to customer.

PMS stands for the PANTONE MATCHING SYSTEM®, which is a reference for selecting, specifying, matching and controlling ink colors. The PANTONE formula guide shows corresponding printing ink formulas for each of 1,114 solid colors and provides tear-out chips on uncoated, coated and matte stock for quality control purposes.

Solids, particularly dark ones, challenge the process to the limit, regardless of paper type. On an uncoated sheet, obtaining even, mottle-free coverage can be approached in several ways. First, choose the highest-quality uncoated paper you can find. Its smooth, well-formed surface precludes many problems involving solids. Second, apply as heavy an ink film as conditions allow. Also make sure: 1) that your ink has proper tack so that it flows easily, 2) that cylinder pressure is sufficient to slightly compress the paper surface so that ink hits the “valleys” as well as the “hills”.

It’s possible to substitute one of the traditional process colors with a PMS spot color, a fluorescent ink or even a metallic. A replacement color can be used to emphasize hue within an image, add depth overall or create effects that are as vivid as your imagination.

It is appropriate to “double bump” a match color when you have a large solid area to cover. The double bump allows you to lay more ink on the sheet without affecting dot gain; this allows for smoother coverage in solid areas. Uncoated sheets can have a formation that makes large solids appear mottled with only a single hit of ink. Also, different ink colors respond differently on uncoated stock. For example, reds and yellows typically lay down smoother on the sheet than blues and greens.

Double bumps are used on uncoated paper to improve uniformity of both coverage and density—including PMS colors. They can reduce mottle (cyan in particular) and help to fill in voids and picks.

Solid blacks can be improved by the addition of a 60% under color screen of cyan and/or magenta. A rich black can be created by adding a 40% screen of cyan, magenta and yellow.

TIP:

- Double bumps for large areas of solids are recommended when using uncoated paper.