What is varnish?

Varnish can be thought of as a unique class of inks with special protective and reflective properties. Varnish can be clear or tinted. It can have a glossy, dull, or satin finish. On press, varnish behaves much like ordinary ink.

Varnish can be purely functional. Applied over ink and paper it provides a protective surface that helps prevent scratching and scuffing enabling printed pieces to keep their fresh-off-the-press look longer. Dull varnish, which protects without the slickness associated with gloss, can be used on glossy stock to reduce glare and improve readability.

Employed independently or together, gloss and dull varnishes can also enhance design. Applied overall, they can make a sheet sparkle or give it a smoother, more satin like finish. Used to highlight key areas, spot varnishes can add crispness and brilliance to color, drama and dimension to photography, and punctuation and clarity to diagrams and charts.

Used as a halftone instead of printed as a flat or solid coating, varnish can work to subtly reinforce the dimension of an image without calling attention to itself. Conversely, varnish can be an eye-catching presence, enriching the printed page with unexpected pattern and texture. When tinted, varnish may even be substituted for ink.

General characteristics of varnish

Varnish is actually a type of ink. Although sometimes tinted, it is usually clear. On press and while drying, varnish behaves very much like any other ink. The characteristics of varnish have been greatly improved over the past twenty years. Today’s varnishes set and dry faster, harder, and glossier (or duller); and most of them provide multiple functional features.

How does varnish work?

The crispness of the illustrations and type, the depth and saturation of the colors these are what draw attention to a varnished piece. Certain images may actually seem to rise from the background, while others appear to recede. This effect is produced by the degree of reflectivity of different varnishes. It can be creatively used to separate images, to emphasize contrast, and to provide surprise dimension in design.

Gloss Varnish

Creates a surface that looks smoother than the ink and paper it overprints. Fills in the irregularities of a paper and ink surface, drying to form its own virtually level surface. Because light reflects off this
smoother surface at identical angles, there is little, if any, diffusion of light. The result: the printed image appears crisp and sharp.

**Dull Varnish**

Imparts a velvety texture that scatters and diffuses reflected light, eliminating glare. Dull-varnished images and type have a softer look than those overprinted with gloss varnish or those printed on plain paper.

This occurs because dull varnish contains platelets that rise to the surface as it sets and dries. The final arrangement of the platelets is so irregular that light rays striking them are reflected back in many different directions, diffusing the light. The result: the printed surface appears dull.

**Combination Varnishes**

Effects achieved with a single varnish can often be heightened by using a combination of varnishes to maximize contrasts, or by applying a second hit of the first varnish to emphasize its effect. Playing varnishes off dull and gloss inks, and gloss and dull coated papers, can also add drama to design. In each instance, the variation in reflectivity is accentuated.

**TECHNICAL BACKGROUND AND PROBLEM SOLVING**

**The importance of planning**

Varnishing effects are not difficult to produce. However, because varnish does add an additional element to the printing process, it must be considered an integral part of a job and taken into account during the earliest stages of planning. When problems do occur, they’re usually the result of introducing varnish as an afterthought, particularly as a remedy for oversights or complications in paper choice or presswork.

Remember that varnishes differ considerably from one to another and that a varnish that works well with a specific paper and set of inks may be unsuited to others.

Follow these guidelines, and the potential for varnishing problems will be greatly reduced:

* Be sure that the designer, production manager, and printer all understand and are in agreement on specifications. Like any variable in a job, varnish must be carefully chosen.
* Make sure that your varnish is compatible with the press as well as with your inks and paper stocks.
* Make sure that it will meet your predetermined end-use requirements.

**Preparation of Varnish in InDesign**

Varnishes, although they are ink, can be treated like a special process in terms of file management.

* Add a spot color to your swatches palette that you are not using elsewhere in the document
* Create a new layer, name it “Varnish” and move it to the top layer
* On that layer, create solid shapes of that color EXACTLY (use the transform palette to be precise in your placement) where you want
the varnish to appear
* Highlight your varnish area on your mark-up
* List the type of varnish in the inks section of your spec sheet

Chemistry of varnish

Varnishes contain varying combinations of resins that provide strength, body, and gloss, which are dissolved in drying oils such as tung, linseed, or an alkyd. Solvents, waxes, and sometimes pigments are also included in the formula. Although the final selection of resin/oil composition depends on end-use requirements, the primary objective in formulating a gloss varnish is to achieve high gloss with good rub resistance.

Resins with tung or linseed oil give the best gloss but have a tendency to yellow with time. Resin with selected alkyds yields a nontoxic, nonyellowing varnish, but one with less gloss and hardness.

To reduce gloss in the formulation of a dull varnish, an agent is added. The agent contains platelet-like particles that migrate to the surface and stand upright when the varnish has dried, scattering light and thus reducing gloss.

Different varnishes meet different running needs

Varnishes can be formulated for a variety of uses. For sheet-fed offset, there are both gloss and dull varnishes, some applied in-line, others off-line. The in-line varnishes have low tack for good trap and are fast-setting to minimize absorption. Off-line varnishing (over a dry ink film) produces higher gloss because a thicker film can be applied.

Gloss and dull varnishes are also available for web offset. The major difference between these and sheet-fed varnishes is in their drying systems. All varnishes formulated for web are designed to release solvent by the heatset (or oven drying) process.

Specific end-use features

Varnishes can be made either imprintable (which is wax free so that distributors names and addresses can be imprinted on catalog covers, for example) or nonimprintable (therefore more scuff-resistant). Varnishes can be formulated with virtually any tack value (and thus be compatible with any set of inks). They can be nonyellowing (an important feature in posters, point-of-purchase, and other items exposed to light over long periods of time), and they can be low-odor and nontoxic (for food packaging). They can have low-slip properties (reducing the tendency of printed pieces to slide when stacked or pressed together). And they can have high rub resistance (good protective qualities so neither varnish nor ink is likely to rub off).

How does varnish behave on press?

Although the running characteristics of varnish are almost identical to those of ink, a few exceptions should be kept in mind. An average film thickness is usually sufficient to achieve desired effects. With more varnish, effects can be enhanced; however, too thick a film, particularly at high press speeds, can cause blocking. Conversely, if a film is too thin, varnish drains into the paper and its effects are lost. Thin film also have higher tack (again because of fast drainage) that may become contaminated by the underlying wet inks.
Drying

Drying time for varnish is about the same as it is for ink and is influenced by a combination of factors: type of varnish, type of ink overprinted, percentage of ink coverage, paper characteristics, fountain solution, humidity, and temperature.

Most varnishes dry mainly by oxidation augmented by absorption. These varnishes are somewhat slow in hardening (or polymerizing) and may require anti-setoff to prevent sheets from sticking together. But powder reduces gloss and gives a sandy feel to the sheet if too much is used.

COMMON PROBLEMS

Problem: Failure to specify imprintability
This is one of the most common and easily avoided varnishing problems. It occurs because a client fails to inform the printer that one or more areas of a gloss-varnished piece will be imprinted at a future date. Or, in the case of folders, it's not specified that glue will later be applied to tabs or other structural features.

Solution: Plan ahead

Problem: Burnishing or polishing
This condition occurs when dulling particles are flattened by scraping or when the spaces between them are moistened by oil from fingers during handling. In both cases, a smooth surface is the result, which appears glossy in the affected areas.

Solution: Order the hardest dull varnish available. Design so that dull-varnished areas have least wear.

Problem: Varnish ghosts
Varnish ghosts are faint silhouette images, usually milky white and identical in shape to whatever backs them up on the reverse side of a sheet. Such ghosts are created by ink solvent vapors breaking through the varnish film. These vapors get sealed in by the ink as it sets. When varnish is applied, it re-wets the ink surface and releases them. The vapors then escape through the varnish, leaving behind vent holes, which create the ghostly image.

The problem might be avoided altogether by varnishing in-line or by waiting until the ink film is completely solvent-free. When ghosts do occur, an additional layer of varnish may be applied to fill in the vent holes and create a uniform gloss (or dull) level. Experience has shown that the varnish originally used rarely works in this role, and finding one that does may require numerous trials.

If ghosts are noticed before an entire job has been varnished, sheets can be blanked through a press equipped with an infrared heater. When such a press is not available, simply blanking the sheets on a regular press can add enough oxygen to accelerate ink drying.

Solution: Varnish in-line or wait until the ink film is completely solvent-free. When ghosts do occur, run additional varnish, or is the problem noticed before the job is finished, blank the remaining sheets through the press.