

### IN-LINE UV COATING OF SHEETFED LITHO REVISITED

When we last addressed the subject of in-line UV coating of sheetfed litho printing, in a 2/97 *TechTalk*, extended delivery double coater sheetfed presses were new. At that time, we reported that some printers were having success with the use of conventional inks, primed in-line with aqueous primer (dried using IR and air knives), finished with a second bump of in-line applied UV coating (cured with a UV dryer). Best results were obtained where there was light ink coverage such that final UV coating gloss values approaching 90% reflectivity @ 60 degrees were achieved. At the other end of the spectrum, when ink coverage was heavy, gloss-back or dry-back reduced area gloss results by 20-30% in the worse cases. These double coater presses also offered the printer the capability of spot coating flexo metallic inks using the first tower coater.

Gloss-back or dry-back are the terms applied to the loss of gloss that is observed over areas of heavy conventional ink coverage (and at times certain colors) after in-line UV coating. Sometimes this drop in gloss is noticed soon after UV coating and at other times many hours later. Reduction in gloss is attributed to the still wet conventional inks drying over time under the coatings. The amount of gloss loss is dependent on the amount of ink under the coatings, line speed, the type of stock printed, and the chemistry of the inks and coatings.

Because of these problems, including lowering press speeds to achieve better results, most printers have struggled to produce acceptable product. Many printers, fully understanding the allure of UV coating in-line, have worked diligently with suppliers attempting to resolve issues and evolve an acceptable process.

*So where are we today?* What's new is, that by trial and error, manufacturers of inks, coatings, presses and dryers have evolved a concept that works to the printers' benefit. This concept relies on the development and availability of so called hybrid inks. These inks, now offered by almost all ink companies, are comprised of conventional litho paste ink components that are combined with some UV curing components. The idea is to create a printing ink that has better compatibility to the UV coating chemistry and the in-line coating process. Essentially, what happens in practice is that the hybrid inks are set or partially cured by exposure to a UV lamp placed after the last print unit. Hybrid inks, because of their conventional components, also oxidize and polymerize over time like conventional litho inks do.

While some sheet-fed litho presses are equipped with only a UV coating application trailing UV curing module (multiple lamp), the best minimal gloss-back results are being obtained when a separate, last print unit, UV ink curing module (single or double lamp) is utilized. This type installation allows the hybrid inks to be set before they are UV coated, rather than inks being set and coating being cured at the same time. It's been found that curing (setting) of hybrid inks must be accomplished before UV coating is applied in order to minimize and avoid UV coating gloss-back.

Characteristically, the UV components of hybrid inks will not cure after the printed job leaves the press and exposure to its UV curing units. This is a fact that the user of hybrid inks will have to keep in mind.

One needs to be aware that the UV curing of any UV ink or coating is dependent on the amount and intensity of UV energy that is delivered. Ink film thickness is a factor. UV light is unable to penetrate thick-trapped ink films leaving them only partially cured. Some printers are best advised to equip their press with an inter-station UV curing unit to enable curing first down opaque black or white prints before finally curing/setting additional trapped, density building prints.

The new hybrid inks have been formulated to print very much like conventional oil based sheetfed litho inks, producing similar dot reproduction, gains and trapping results. Similarly, performance on press, water balance and ink body are familiar. Further, the hybrid inks do not require special roller compounds, blankets, plates or fountain solutions. Because the inks contain a functional portion of UV materials, most of them will not skin over in the can. All in all, hybrid inks seemingly offer all of the advantages of conventional inks except one. That one is price. When compared, 100% UV inks are reportedly at least twice the price of conventional inks with hybrids falling somewhere in between, reportedly at the high end of that range.

What this says for now is that the sheetfed offset litho press-room has a workable *in-line* high quality printing and high gloss UV coating process available, but at a cost. The process is more costly in terms of the UV curing equipment required, complexity and ink price as compared to a conventional ink press, but there are economic and productivity advantages over the alternative represented by off-line UV coating.

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Very significantly, sheetfed presses equipped with a tower coater, of which there are many in the field, can be retrofitted to utilize this process. All that is needed is room to install a single lamp (double lamp preferred by some) UV curing module, after the last print unit and a multiple lamp UV curing module after the tower coater (unless an inter-station UV module is also advised).

Sheetfed printers who buy into these in-line capabilities can now offer the faster service demanded by today's customers. Sheetfed printers no longer have to rely on outside finishing suppliers to off-line UV coat, or alternatively, UV coat in-house using second pass operations. The printer simplifies, improves productivity, preserves flexibility (the ability to switch between conventional inks and hybrid inks for UV coating), and reduces his costs (comparing to off-line UV coating on-site or off-site).

It's important to make a point of the fact that because of the on-press compatibility offered by hybrid inks, printers can readily switch between cheaper conventional inks when not in-line UV coating. This is important because printers typically are not dedicated to UV coat all of their printed output, in fact usually only a small percentage is UV coated.

Further answering the question, "*Where are we today*"? We can say unequivocally that printers are able to utilize a variety of print/coat methods to satisfy printing buyers.

Many printers continue to print using conventional inks and aqueous coat in-line to achieve gains in productivity and saleable aesthetics. Some of these printers also offer the further benefits of UV top coating accomplished off-line in-house or off-site.

Other printers, who have purchased double coater presses, continue to produce salable in-line work using conventional inks and aqueous primer followed by UV coating.

Finally, as we've been discussing, sheetfed printers have the capability to invest in the latest in-line printing/coating process featuring the use of hybrid inks and UV coating.

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