SunChemical®

ULTRAVIOLET CURING: SOME FACTS

Ultraviolet (UV) curing uses high intensity UV light to start the free radical crosslinking of acrylate oligomers and prepolymers. Other systems based on cationic chemistry are available but free radical is the most common. In a simple sense, the UV light causes the ink or coating to change from wet to dry product. The curing is fast and relatively cool so curing inks and coatings on heat sensitive substrates is possible. Because the inks and coatings are crosslinked, the properly cured products yield high chemical and physical resistance.

The UV products are 100% solids so they satisfy EPA demands relative to emissions. There are no volatile solvents to pollute the atmosphere or the press room. Without any solvents the viscosity of coatings and inks does not change due to solvent evaporation.

The curing rate of inks depends on the color involved and how opaque the ink is to the UV light. Since the darker and more opaque colors block the light, these inks require longer exposures or higher intensities to adequately cure. It is recommended that on presses with interstation curing, that the slower curing colors be printed first so that subsequent exposures assist curing. Thicker films or multiple films will also cure more slowly relative to thin or single films of inks and coatings. Proper selection of equipment, coatings and ink can minimize the problems but cannot alter the facts.

The number of lamps which a UV product requires to cure is proportional to the speed. If a coating has a cure speed of 150 ft. per minute with one lamp, then you will need 3 lamps to run at 450 ft. per minute and 4 lamps to run at 600 ft. per minute. Due to pigments in the ink, they would typically cure at slower rates than the coatings. Exact speeds are difficult to quote due to substrate, lamp and end product requirement variations.

A detailed discussion with knowledgeable ink chemists can provide recommendations as to the required curing parameters. In setting up a curing line, it is better to have a little extra curing power to handle any unplanned conditions and compensate for worn lamps which are not as efficient.

Although it does not matter to the operating crew, UV curing is really an instantaneous two step chemical process. In the first step, the light (UV) energy is absorbed by the photoinitiator and is converted to free radicals through several mechanisms. In the second step, the free radicals attack the acrylic double bonds and cause the ink or coating to polymerize. The second step in the process is helped through thermal input which the UV lamps also provide. Since the curing process takes place so rapidly, to achieve maximum gloss it is desirable to allow for some leveling time between application and curing.

Normally, when the exposure to UV light ends, free radicals stop being produced and the curing ceases. Post curing does not take place. This is why adequate lamp power and quantity is a necessity.

SunChemical®

The handling of UV inks and coatings requires some re-education of press crews. By following a few simple procedures, the use of UV curing inks and coatings will offer no more problems than conventional products. This subject is covered in detail in a pamphlet or video presentation. These are available upon request.

The UV inks and coatings do not have FDA approval for direct food contact. These products, just as conventional inks, have been printed on the outside of containers for many years and have proven acceptable for this type of application. In food packaging or other sensitive situations, electron beam cured products do offer a higher safety margin due to higher crosslink conversion and the lack of photoinitiators. With proper material selection and curing, UV inks can meet similar specifications.

For further details on energy curing, contact your local ***SunChemical*** *branch. A knowledgeable* ***SunChemical*** *technical person will be happy to answer your questions regarding energy curing and the specific needs of your operation.*