

02/05

UV/EB - FREQUENTLY ASKED QUESTIONS? PART 2

? Why use UV/EB curing?

Both processes allow printing to be produced with higher quality. You can obtain improved color density with very little dot gain, printing, varnishing, and coating at higher speeds, gaining productivity. Both processes consume less electrical energy than do hot air thermal ovens or IR emitters. Coatings offer dramatically higher, deeper gloss!

? How do the costs of UV/EB curable products compare to conventional products?

Although UV/EB curing products are higher in cost, as much as twice the cost, on a pound basis than conventional products, the cost on an applied coverage basis can be competitive. UV/EB curable products are 100% solids. This means that UV/EB curables go farther; less ink, coating, varnish or adhesive is required. There is no ink oil to be absorbed or solvent to be evaporated. UV/EB curables do not dry up during use; they do not require daily wash-ups wasting product. When all is considered, faster start-up times, faster printing, less waste, less labor, lower energy costs, the net is that UV/EB curing can actually be less costly.

? What amount of power is required to reach full cure?

The curing of UV/EB curables depends on the thickness or amount of product there is to cure and press or process speed. Whenever the thickness of applied UV/EB curables is increased, more UV or EB energy may be required. Since the criteria are cure integrity, one needs to test to determine that cure is adequate and meets end product specifications.

? What humidity and temperature levels are recommended in the pressroom?

Humidity and temperature can have a great effect on printing/coating affecting substrates mainly. It is highly recommended that humidity be maintained at 60% and temperature at 64-68° F, 18-20° C.

? What amount of UV energy does a UV lamp emit?

UV energy impacting a UV curable is dependent on lamp housing, bulb dimension and optics. The

operating power of a lamp is expressed in watts per inch of bulb length. Typically this could range from 200 to 600+ watts per inch. UV energy output is combined integrated energy or dose and peak irradiance. Output/dose is measured in milli-joules per centimeter squared (mJ/cm²) and watts, the focused power directly under the lamp. The longer the time of exposure, the greater the dose/energy impacting the UV curable. Irradiance is not time dependent and is the same at all curing line speeds.

? How long will a UV lamp last?

Most UV lamps are warranted for a use of 1,000 hours, but many will last longer, even 2,000 useful hours. Lamp life depends on the curing power levels used. When low and medium power levels are only used, a lamps useful life is extended. Poor maintenance, dirty bulbs and reflectors that cause power levels to be raised will shorten lamp life. Improper air or cooling water flow to a lamp housing, raising lamp-housing heat, will shorten lamp life too.

? How is EB power described?

Dose rate translates to the amount of energy delivered to the cure zone. Dose is expressed in megarads and it is a function of the electron beam current, the accelerating voltage applied and the speed of the product to be cured moving past or through the cure zone. EB penetrating curing power (accelerated electrons) in an EB curable material is directly related to the accelerating voltage applied.

? What is the function of photo-initiators?

The fundamental role of photo-initiators in UV curables is to react to low energy photons of UV light so that the cross-linking UV cure is initiated.

? What do I have to do to safely dispose of cured or uncured UV/EB curables?

Cured UV/EB curables are not hazardous waste so they can be disposed of in the normal waste. Uncured UV/EB curables are another matter and care must be taken to dispose of them properly per state, local and federal regulations.

? Is it possible to use UV/EB curables on heat sensitive thin film substrates?

Heat management is the key to successfully using thin films in UV curing systems. The UV lamp quartz tube operates at about 900°C and it emits infrared radiation (IR). Customarily, UV systems are designed to control heat by using either air or water-cooled lamp housings. Technology is also available in the form of dichroic shutters and dichroic quartz filters that control IR radiated heat, so that thin films can be printed/coated. Chill rolls or cold plates under the substrate are also sometimes used. The EB process does not generate excessive heat so the use of EB curables on thin films is not an issue.

? Is it advisable to turn off UV lamps during a rest, lunch or other breaks from production?

The more UV lamps are switched on and off the more the life cycle of the lamp is affected. Switch them on and off too often and a drastic shortening of lamp life will occur. Follow UV equipment mfrs guidelines, which usually recommend:

- Use the standby mode for short production disruptions of up to ½ hour.
- Shut the lamps off when a shutdown of more than an hour is expected.

? What happens to UV equipment during an emergency stop?

When an emergency stop is triggered, the modules cooling system continues to run and generally the UV lamps are turned off to protect UV equipment.

? Is heating of UV/EB varnishes and coatings advised to improve flow on a substrate?

Follow the supplier's guidelines; some recommend heating to improve flow because viscosity is reduced as the temperature of an energy curable product rises. Some recommend an application temperature as high as 95°F or 35°C. Check with the energy curable supplier before taking this approach.

? What is post-cure?

Post-cure may be described as curing that continues in UV energy curables for as long as 24 hours after UV exposure. This is the result of polymerization or cross-linking of monomers and oligomers continuing after exposure to UV energy.

? What's the best way to measure the surface temperature of a substrate?

The best device to use is a non-contacting optical thermometer available for approximately \$100.00 US. It is not practical to use a thermocouple, and

while temperature tabs can give an approximation of substrate temperature, it's an effort to place them and recover them for evaluation.

? What causes brittleness in UV coatings?

Brittleness generally shows up as cracking during scoring of substrates or as poor scratch resistance. The cause is excessive cross-linking and/or a coating that is not well matched to the operations UV lamps energy output.

? What can I do if I fingerprint a bulb or its surface becomes contaminated in use?

A bulbs surface can be cleaned using a lint free cloth and cleaners such as Windex® or Simple Green®. Cleaners must be free of any waxes, silicones, dyes or perfumes. Solvents such as isopropyl alcohol or methanol may also be used. In extreme cases Soft Scrub, a mild abrasive can be used but rinse thoroughly before reinstalling. **Never** use an abrasive on a reflector. The cleaners may also be used on reflectors. (Fusion UV Systems recommendations.)

Contact your equipment, formulated UV/EB curable product supplier for their recommendations related to any of the frequently asked questions discussed above.

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LOOK TO CORK!.... for expertise in formulating aqueous, UV & EB specialty coatings.