Cork Tech TalkNews

Manufacturers of Waterbase, UV+EB Curable Coatings, Varnishes and Adhesives

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UV/EB LAMINATING EXTENDS ITS REACH

Flexible packaging has been the fastest growing sector of the packaging industry for the past several years. New forms of flexible packaging, especially the stand up pouch, have been a large factor in this growth.

Photo Courtesy Amgraf Pkg.

Flexible packaging typically consists of laminated layers of mono-ply films, foils and papers or multi-ply co-extruded films. Before ultraviolet/ electron beam (UV/EB) laminating was developed, these laminations were created utilizing extrusion laminating or conventional adhesives. Conventional adhesives include one and two component water and solvent-based types, as well as, two component solvent-less types. UV/EB laminating adhesives overcome many of the objections inherent to the traditional adhesive laminating techniques such as, lengthy time delays to reach complete cure, and the inability to confirm bond strength immediately after lamination.

Normally, UV laminating necessitates that one of the laminating films be clear to allow the UV light curing energy to reach the UV curable adhesive to accomplish cure. However, you will see that there are two techniques that have been evolved that allow the UV adhesive lamination of two opaque webs. EB does not have this restriction, and is the technology of choice, when considering the lamination of typical constructions. For example, a reverse printed top web that is to be laminated to a metallized or otherwise opaque (white) back web. EB has the ability to penetrate and cure through the majority of opaque materials that might be used. EB has the further advantage that it doesn't require photo initiators to advance cure (as UV formulations do) which allows EB products the potential to be low odor, low migration performers.

UV/EB laminating adhesives have achieved great penetration of the label industry producing pressure sensitive labels both cut-and-stack and roll-fed types. UV energy curing of popular lamination constructions provides important protective properties to printed graphics, including abrasion, scuff, tear, chemical and moisture resistance. The reverse printed top film layer can also aesthetically improve a label, offering a high gloss finish.

Flexible packaging product applications include pouches, some of which now are laminated, using 100% solid adhesives.

Photo Courtesy Capri Pkg.

Metallized/holographic films laminated to folding carton paper-board substrates have also been in great demand offering a glitzy eye- attracting look to the consumer.

UV/EB laminating adhesives offer the industry the ability to laminate in-line at high speed. Narrow-medium web presses, especially flexo, are proving to be attractive in benefits, when adapted to produce in-line lamination of reverse printed films to paperboard stocks. Benefits include higher production speeds, and lower costs. EB offers the broadest advantages since it, as a technology, provides the ability to cure

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through opaque and semi-opaque printed films.

Several laminating adhesive processes have been developed. They differ basically in their ability to laminate where one film must be clear, vs where the films can be opaque or semi-opaque, including reverse printed films.

1. **EB curing laminating adhesives may be used to laminate two opaque webs of materials together. In this process a base web of material is coated with an EB laminating adhesive. An opaque or clear reverse printed over-laminate web is brought together under a nip, joining the two webs, after which EB energy is applied effectively creating a permanent bonding of the two webs. Key to EB as a laminating process is the fact that EB energy is able to penetrate through opaque materials.**
2. **Another technique that allows the laminating of two opaque materials uses a post curing UV adhesive. A UV curing adhesive is applied to a base web material that is then cured by UV energy to yield a green tack state. This surface is then brought together with the over-laminate web under a nip. Somewhat pressure sensitive, the adhesive tacks the two webs together. Subject to post curing by formulation, the adhesive then cures with time to effectively bond the two webs together. UV pressure sensitive adhesives are also used to bond a clear, reverse printed clear or opaque over-laminate web to a base substrate web in-line. In this technique adhesive is applied to the base web material that is then cured by UV energy to yield a pressure sensitive adhesive. This surface is then brought together with the over-laminate web under a nip, the pressure of which yields a pressure sensitive adhesive bonding of the two webs. Both webs of material can be opaque in this laminating process.**
3. **UV curing adhesives can be used to laminate a clear over-laminate film to a printed web in-line. Typically the adhesive is applied to a printed web substrate, which is then brought together with a clear laminating film under a nip, after which curing UV energy is applied through the clear film. A permanent bond is created immediately after UV energy exposure.**

Laminated structures created by the above techniques, except the post cured adhesive laminating process, may be immediately processed further by slitting, rewinding, die-cutting or sheeting, because they benefit from an immediate permanent bond after UV/EB energy curing. The pressure sensitive UV adhesive technique does not create a permanent bond in that by the nature of the adhesive (pressure sensitive) the adhesive remains tacky after UV energy curing. The post-curing UV laminating adhesive technique suffers the disadvantage of requiring time after UV exposure to affect a permanent bond. It is however, a UV laminating technique that can bond two opaque materials together.

EB adhesive laminating is a very effective process to laminate two opaque materials together with strong permanent bonds created immediately after EB exposure. The bonds that are produced have good heat and chemical resistance. Another advantage is being able to EB cure without having to create an inert curing zone, eliminating cure-impeding oxygen. Oxygen is effectively eliminated in EB adhesive curing zone located between the two webs in intimate contact.

UV/EB laminating adhesives offer great potential to the packaging industry, which is always looking for unique substrates to more effectively package products, while at the same time titillating the purchasing consumer.

Photo Courtesy PrintPak

Those converters who have adopted UV/EB laminating adhesives have found many advantages attributable to these energy-curing technologies. Among these advantages are, lower costs, improved product properties, unique novel laminate structures, lower drying/curing energy costs, compact lines, and in-line processing incorporating printing.

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