



# klöckner pentaplast

## white paper

### CONSIDERATIONS FOR SELECTING OVERLAY CARD FILM

The use of thin gauge clear PVC film (overlay) in plastic card manufacturing is quite common. Uncoated overlay is used to laminate blank white cards. Uncoated film is used primarily when no ink is present to separate the base PVC core stock from the overlay. When ink and artwork are present, a coated overlay will be necessary to achieve sufficient bonding of the clear overlay to the card.

A variety of options exist which include combinations of PVC film and adhesive coating. The choice of the clear PVC overlay film and the adhesive coating should be considered separately as they each contribute to the combined performance of the coated overlay.

PVC overlay characteristics include hardness, surface texture, color, clarity, and processability.

**Film hardness**, inversely related to softening point, can be qualitatively measured. The preferred method in rigid plastic development

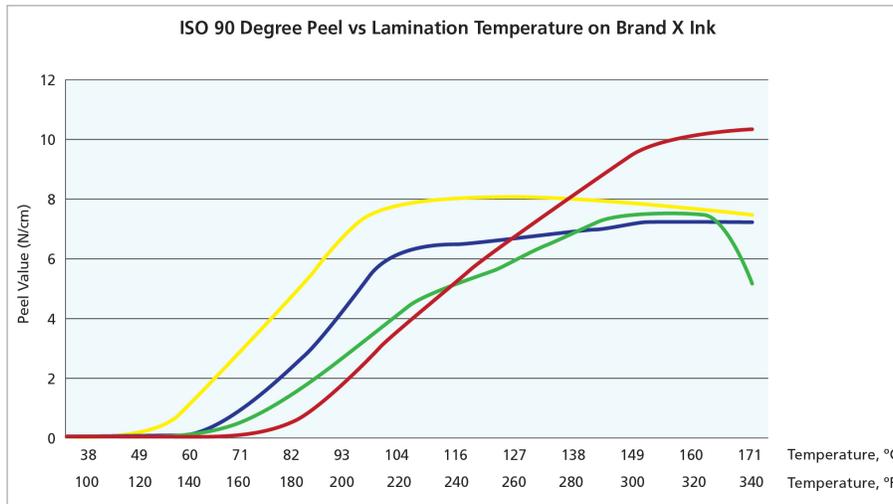
is Vicat Temperature. This is the temperature at which a weighted needle starts to penetrate a thick specimen of the plastic when slowly heated from room temperature. This value can be compared between film formulations to determine lamination characteristics of interest. A film with a lower vicat might be suitable for a low temperature lamination cycle whereas a high vicat film will require higher lamination cycles. A card made with low vicat overlay may be easy to personalize. Whereas a high vicat film may exhibit difficulties in hot stamping, dye sublimation, or inkjet printing. Other processing issues will also be affected such as magnetic stripe laying and diecutting.

A **surface texture** is imparted on the film to aid in roll and sheet handling, magnetic striping, and collation during the card manufacturing process. This added texture of the film is washed out during lamination in a process called "planishing." The final surface finish of the card is controlled by the steel lamination plates and the lamination cycle.

The adhesives on coated overlay make use of this hot lamination cycle as well. It is this elevated heat and pressure that activates the adhesion of the coated overlay to the card body.



Adhesives will react in different ways during the lamination cycle. The chart seen here is an indication that various commercially available adhesives have different activation curves. Inks that can tolerate high temperature might require an adhesive system that activates later in the heat cycle. Inks (and card materials) that discolor or degrade at high temperatures require a lower temperature activating adhesive to bond the card without detriment to the printed artwork.

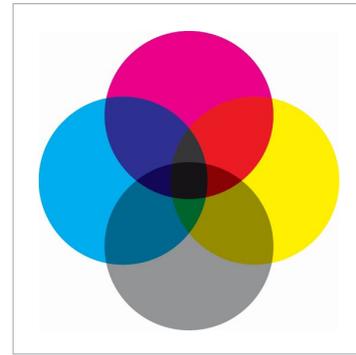


**Distortion** of the printed image may occur during heat lamination. This is due to core stock motion during lamination and the image simply following along with the substrate. Overlay adhesives have been known to help or hurt this issue. If the proper lamination setting cannot be discovered to solve ink distortion and ink cracking issues, it may be possible to reduce the effect with an overlay adhesive change.

**Colorshift** can occur with printed artwork after lamination to adhesive coated overlay. If this occurs, the compatibility of the ink and coating chemistry must be considered. It is possible for the chemical activation of the adhesive at elevated temperatures to interact with the chemistry of ink formulations. The ink manufacturer should be cautioned that inks will be subjected to heat, pressure, and dissimilar polymers in the coated overlay. Again, if problems arise, and a suitable lamination cycle cannot be determined, it may be necessary to evaluate alternative coated overlay formulations.

Adhesive systems are developed with specific **substrates** in mind. That is, the backbone polymer and associated functionality is engineered to adhere to a specific set of plastics. Polyester, polycarbonate, ABS, polypropylene, et al., require different formulations to obtain acceptable bond. It is important for the card designer to discuss these compatibilities with their adhesive supplier to ensure success.

Finally, and, most importantly, bond value is a direct result of compatibility between **ink formulations** and adhesive coating. There are multiple ink manufacturers that serve the plastic printing industry and no one universal adhesive coating will bond to them all. Coating formulators have found it necessary to develop alternative adhesive chemistries to react to variations in ink formulations. Oxidation cured, UV energy cured, and digital ink variations have presented the greatest challenges. The plastic card's artwork, created by ink color variety, is a challenging variable in overlay bond. Consider all the chemical elements that are available to ink manufacturers to formulate inks.



Then include the addition of environmental and fountain solution effects to the surface of offset printed cards. One can easily perceive the expansive range of surfaces onto which today's coated overlays are required to bond.

### **SUMMARY**

The selection of a coated overlay to be used in card manufacturing can be complicated. Acceptable results can be achieved if done in conjunction with your overlay supplier. kp technical support can assist you with material selection.

Klöckner Pentaplast Group  
Europe:  
P.O. 1165, 56401 Montabaur  
Industriestraße 3-5, 56412 Heiligenroth  
Germany  
Phone: +49 2602 915-0  
Fax: +49 2602 915-297  
www.kpfilms.com  
kpinfo@kpfilms.com

Klöckner Pentaplast Group  
Americas:  
3585 Klöckner Road  
P.O. Box 500  
Gordonsville, VA 22942 USA  
Phone: +1.540.832.3600  
Fax: +1.540.832.5656  
www.kpfilms.com  
kpinfo@kpfilms.com

Klöckner Pentaplast Group  
Asia:  
12 Xia Sheng Road  
Suzhou Industrial Park  
Suzhou 215126, P.R. China  
Phone: +86.(0).512.6260.9991  
Fax: +86.(0).512.6260.9992  
www.kpfilms.com  
kpinfo-CN@kpfilms.com