



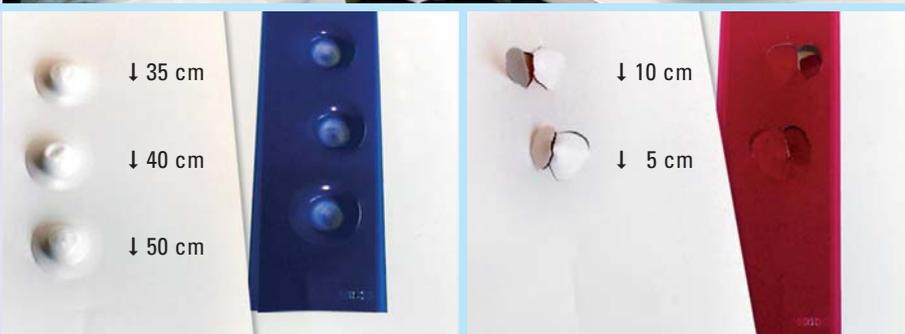
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# PRINTING OF PVC SUBSTRATES

## WITH UV-CURING SCREEN PRINTING INKS



There was a time when these material types were mainly printed with solvent-based screen inks. Nowadays large amounts of plasticized and rigid PVC foils of various thicknesses are printed using multi-colour screen printing equipments. Development of UV-curing screen printing was a must for this progress. Already mid of the 70ies a more or less comprehensive range of UV-curing inks was available to screen printers. When developing these first ink ranges one quickly noticed, that UV inks show excellent adhesion on PVC adhesive foils and rigid PVC materials. Nevertheless ink adhesion is not the only criterion for the suitability of an ink system. No wonder that then there were quite a few problems and complaints of customers using UV-curing inks. Optimum UV-curing screen printing inks for PVC materials have only been available for a few years now. They have a very high reactivity and cure with an energy of less than 200 mJ/cm<sup>2</sup> - this is a basic condition for processing in multi-colour lines. Furthermore these newly developed UV inks only have a very limited effect on the material properties of PVC materials. There are two main groups of PVC materials used for graphic screen applications.



### 1. PLASTICIZED PVC FOILS

for various items and automotive applications. These have to be decorated by screen process.

### 2. RIGID PVC FOILS

of various thicknesses for the production of high quality plastic posters.

Problems occurring when printing plasticized and rigid PVC materials with UV inks are very different.

When printing plasticized PVC foils you have to pay attention to material shrinkage and possible adverse effects on

PVC is surely one of the most traditional substrates used in the screen process. Although there have been quite a few attempts in the past to substitute PVC materials used for self-adhesive foils and rigid PVC sheets with polyolefin materials, PVC still is and will remain the main substrate for graphic screen printing.



the elasticity of the foil. Almost all UV-curing ink systems will adhere to these foil materials, however, these ink systems will mainly have different effects on the stability of the foil material. Unprinted PVC foil can be stretched and thus be applied on edges and grooves. If, however the foil is printed with an ink system that is not suitable for the intended further processing these originally elastic foil materials will tear like paper. These problems may already appear when applying the foil to the articles. Independent from that it will not be possible to completely remove the foils after a certain amount of time.

Naturally these foil problems will increase with the size of the applied film of UV ink. If customers even require an additional overprinting, then problems are even worse. The printed foils will become so brittle that you cannot remove them from the carrier paper without damaging them.

Changes of material properties also play an important role when printing rigid PVC materials. Rigid PVC foils are very thick and will therefore not tear – quite often PVC materials have a thickness of 280 µm. Nevertheless after printing the material will become very brittle, which will cause problems during further processing. When you pick up a large format print, printed with a large motive and shake it you can often see that the material breaks and cracks. Due to this reduction in impact strength cracks may appear in the motive when cutting printed edges. Another problem is the dispatch of large-format posters. They may crack when rolled up or when unrolled, especially in a cold environment.

Coates Screen Inks GmbH offers a large range of UV systems and we have done a lot of development work to improve ink systems with optimum suitability for PVC materials.

## UV Curing Screen Printing Inks UVX

UVX was mainly developed for PVC materials. This highly reactive ink system results in tough and elastic UV ink films. It is therefore especially suitable for printing of plasticized PVC foils.

Rigid PVC materials printed with UVX ink will only become brittle to an extremely small extent. This ink system is based on extremely weather resistant binders combined with highly lightfast pigments. Contrary to other UV inks (strong odour of monomers and photoinitiators) prints made with UVX only have very little odour. UVX inks are available in the C-MIX 2000 colour shades (glossy version) and also as process colours. The highly opaque white UVX 60/HD can be used for the production of double-sided stickers and also as barrier layer (obliterating grey) by addition of 5-6% Bronze B 79/13. For white layers and obliterating grey the energy required for curing is only 250 mJ/cm<sup>2</sup>. When printing 5 layers onto PVC adhesive foil the whole print will still be elastic.

In addition to glossy process colours quite often customers also require semi-gloss or matt finishes. In order to meet these requirements a matt version of UVX process colours was formulated. No matter if glossy or matt, UVX prints will hardly have any influence on the flexibility of the PVC material. Weather tests of UVX process prints showed excellent light fastness and weather resistance. Prints made with UVX will probably have an outdoor resistance of 3 years and longer without additional overprinting.



Ink systems like UVX, based on high quality acrylates, will offer many advantages when printing onto PVC materials. Although more universal ink systems may be suitable for more substrates you will never be able to avoid adverse effects on materials, especially on the important substrate PVC.

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