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UV-CURING INK SYSTEMS (CONSIDERATIONS TO BE MADE REGARDING CHOICE OF UV-INKS)

Screen ink manufacturers are constantly improving, developing and optimising UV-ink systems. Considering the broad range of products available several ink systems may basically be suitable for one substrate. It will pay however, to compare quality features of various ink systems and obtain advise from application departments prior to printing.

Choosing a UV-ink system requires the following considerations

SUBSTRATE

Just like with solvent-based inks the material used must be printable, main aspect being adhesion. Product data sheets will give general information like printing of PVC, polycarbonate, polystyrene and other substrates.

REACTIVITY

Many UV-driers installed at screen companies only have low energy for curing of UV-ink films. It is not always possible to supply the amount of UV-energy required to cure a UV-ink by reducing belt speeds. When doing this there may even result serious thermal problems. Various UV-ink systems require energies between 100 and 500 mJ/cm^2. 4-colour lines, however often only have a minimum value of UV-energy to cure screen ink films. Addition of photo initiators partially will improve curing, but may have an adverse effect on the properties of the UV-ink film.

ADVERSE EFFECTS ON MATERIAL PROPERTIES

Printing UV inks onto thermoplastics may influence the stability of the material. This mainly occurs with plasticized PVC-foils suffering a significant loss of tear resistance - or also with rigid PVC where impact strength is reduced. Another important aspect is polymerization shrinkage of cured UV-ink films as problems may occur with flatness of thin plastic foils.

FURTHER PROCESSING OF PRINTS

In that respect forming properties of the prints are very important. If, e.g. you want to fold prints, the ink must not tear at the edges. For forming processes such as deep drawing you need to use a UV-ink system showing the necessary elasticity during the forming process. Such work can only be carried out using highly flexible, thermo-mouldable UV-curing products.

OUTDOOR RESISTANCE

Highly weather resistant UV-curing ink systems are often used for large-scale prints for indoor applications. Even though this is possible the same work could be carried out with lower-priced inks. On the other hand for long-term outdoor applications you should use ink systems and materials with a high light fastness and weather resistance. UV-curing inks for these types of applications show the same outdoor resistance like high quality solvent based inks.

CHEMICAL AND SOLVENT RESISTANCE

UV-curing ink systems are supposed to show a similar high chemical or solvent resistance than 2-component inks. This, however, is not always the case. Degree of cross-linkage of resins and monomers will significantly influence chemical and solvent resistance. Ink systems with a high degree of cross-linkage are often resistant, whereas inks with a low degree of cross-linkage (such as thermo-mouldable inks) generally show less resistance or none at all.

PRICE

Choosing suitable UV ink systems you can surely carry out prints at the best possible price. Taking into consideration the important choice criteria for UV inks, it becomes quite clear that you cannot only use one universal ink system. The same applies to solvent-based inks. Following this short introduction you will find a list of the most important UV ink ranges and their characteristics.

Martin Kremmeter
[Laboratory: UV-ink systems]

UV-CURING INK SYSTEMS

These are not all UV-ink ranges of Coates Screen Inks GmbH, but only those ink systems showing outstanding properties. In addition to these short descriptions of those ranges it will also be suitable to refer to the detailed product data sheets of these ink types.

CHOICE

MULTISTAR – MULTIPLE APPLICATIONS

MULTISTAR MLS is a price-efficient ink system for various graphic screen applications. This ink system is especially suitable for poster printing and shows adhesion on common substrates such as paper, cardboard, rigid PVC, PVC self-adhesive foils and polystyrene. Due to the good flexibility of this ink system there is hardly any brittleness and further processing such as cutting/punching is possible.

UVE – FIRST CHOICE FOR POLYSTYRENE

This ink system shows excellent adhesion and suitability on polystyrene. Due to the high reactivity and rigidness UVE inks processed on quick running machines result in highly resistant ink films. UVE inks also show good adhesion on PVC materials, e.g. for technical labels.

MUSKETEER MTR – FOR FORMING AND DEEP DRAWING APPLICATIONS

MUSKETEER MTR is a UV ink system allowing the screen printer to form and deep draw thermoplastics. MTR shows adhesion on most thermoplastic materials like PVC, polystyrene, polycarbonate, ABS, PET and PMMA. High flexibility and sufficient blocking resistance also allow further processing such as punching and cutting.

UVN – OUTDOOR RESISTANT

The ink system UVN – well known on the market for a long time now - shows an especially high outdoor resistance. UV-resistant binders in combination with lightfast pigments of the C-MIX range result in UV inks suitable for long-term outdoor applications. Being a classic PVC ink system UVN inks exhibit adhesion on rigid PVC, PVC self-adhesive foils, but also on paper and cardboard. UVN shows excellent flexibility and resistances and has therefore been used successfully for many years for printing of coated PE and PP adhesive foils in the label industry. Being highly reactive it can also be used on quick running roll printing equipment.

UVP – CHEMICAL RESISTANT

Ink system UVP is especially chemical resistant. For many years UVP has been successfully used for applications requiring high chemical resistances (acids, alkalines, solvents) as well as abrasion resistance of ink and varnish films. UVP inks show adhesion on PVC, PS as well as powder-coated metals. They have also shown excellent suitability for printing of signs, their high outdoor resistance allowing long-term outdoor use.

UVPO – SPECIAL SYSTEM FOR POLYPROPYLENE

The ink system UVPO is a special ink system for corona-treated polypropylene materials, either sheet or flute materials. Compared to solvent-based inks productivity can be increased to a large extent in multi-colour lines. UVPO adheres to many substrates such as PVC, polystyrene, polycarbonate, ABS and PET-G.

In addition to above ink ranges we offer many special adjustments for various substrates such as glass, CD/DVD, metals, panels etc..

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SUITABILITY OF VARIOUS UV-SCREEN PRINTING INKS FOR DIFFERENT KINDS OF SUBSTRATES

INK TYPE		MLS	UVN	UVE	UVPO	MTR	UVP
SUBSTRATE							
Paper		■	O	O	O	O	O
Cardboard		■	O	O	O	O	O
PVC	adhesive foil	O	O	O	O	O	O
	rigid	■	■	O	O	O	
PE	coated		■	O		O	O
PP	Corona treated				■		
	coated		■	O		O	O
Polystyrene		■		■	O	O	■
ABS				O	■	O	
PMMA					O	■	
Polycarbonate				■	O	O	
PET-G					■	■	
Metal	coated				O		■

■ *recommended* O *suitable*

QUALITY FEATURES OF VARIOUS UV INKS

INK TYPE		MLS	UVN	UVE	UVPO	MTR	UVP
Reactivity mJ/cm² ❶		high 150	high 200	high 200	medium 300	medium 300	medium 350
Negative effects on material properties tear resistance/impact strength		low	medium	high	medium	low	high
Further processing of prints							
	punching / cutting	good	limited	critical	limited	good	critical
	forming	no	no	no	no	yes	no
Outdoor resistance		low	high	medium	medium	medium	high
Chemical and solvent resistance		low	medium	high	medium	low	high

❶ *measured with Kühnast UV-integrator*