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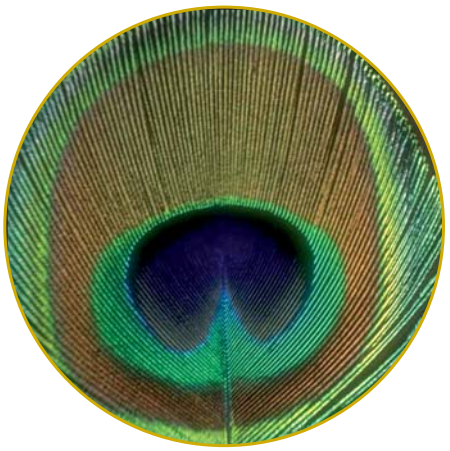
EFFECT COLOURS FOR SCREEN PRINTING



Colours do have a great influence on our daily life, even plants and animals show a great variety of different colours. Some natural colorants such as indigo, carmine and crimson have been used to dye textile materials or even as pigments for thousands of years. Organic chemistry is based on this nature model. A huge industry for the production of organic pigments and colorants has been built up during the past decades.

When talking about colour or colour impressions, first you need to explain what colour really is. Colour is a sensory perception of human beings. The human eye has sensory cells which convert light and colour into electric signals. These signals are passed on to the brain and reversed into a colour impression again.

In addition to the human eye the light, the light source, is also important. The visible light has a wave length range of 380-720 nm. UV light is below and infra red above this range. When perceiving a colour the light falls upon an object, wave length ranges of the visible light are absorbed and the remaining radiation will cause the viewer to see the colour. In that process it is important that our white light, e.g. daylight, has all visible wave length ranges. These wave length ranges become clear when the white light is led through a prism and then split up. Another very well known daily phenomenon is the formation of a rainbow.

In the following article, however, we do not want to report about regular colours, black and white, but about enhanced colours such as metal gloss and pearl gloss.

SILVER AND GOLD BRONZES

Both product ranges are not based on silver and gold as raw materials; when processed they result in optical impressions of gold and silver surfaces, which suggest a high value to human beings. One has always considered gold and silver to be a stable and precious value, coins and jewellery being a good example. Silver bronzes consist of aluminium and gold bronzes of a copper and zinc compound (brass). Pale gold, rich pale gold and rich gold effects can be achieved by various mixing ratios of copper and zinc.

Aluminium and brass bronze pigments are available in paste or powder form and can be mixed into suitable binders, so-called bronze binders, based on the information given by the ink manufacturer. There are two different types of aluminium pigments: "Leafing types" and "Non-Leafing types". Due to their high surfactant tension in the wet film leafing types will float on top resulting in brighter more brilliant metallic printed surfaces. On the other hand non leafing pigments can easily be wetted and are embedded in the printed film and the bottom of the ink film. Use of these products will result in more smear proof and weather resistant screen prints.

Another important criterion necessary to achieve brilliance and special surfaces is the particle size of the aluminium bronze. When printing aluminium bronzes with particle sizes of approx. 10 µm a uniform,

even surface is achieved. Coarse particles, however, will result in the typical metallic glossy effect, which is often required and requested for many applications. Naturally when printing coarse aluminium pigment particles you have to use correspondingly coarse fabrics (e.g. 77-threads/cm). These pigmentations cannot only be used in 2-component and solvent based, but also in UV-curing ink types. In any case you need to contact your ink manufacturer regarding pot life and miscibility of the ink. Coates Screen Inks GmbH offers readily-mixed aluminium inks in various UV ink ranges.

Often aluminium pigments are also used to manufacture special gold or metallic colour shades. In these applications you can take advantage of the characteristic surface of the bronzes by adding highly transparent inks or ink pastes. The advantage of such metallic shades is their high oxidation resistance, a property, gold bronzes do not have.

Another new type of aluminium pigments are aluminium dispersions. Here the aluminium is vapour-deposited in thin layers by vacuum onto polyester material and subsequently removed. Such dispersions have a solids content of 10-20%. With suitable formulations you can produce screen prints with high gloss metallic surfaces. Such inks are called metal gloss inks. The effect achieved is even better if such ink systems are applied as second surface on the reverse side of suitable clear material, such as polycarbonate foils, PMMA and polystyrene foils, sometimes even glass. This second surface print – sometimes backed by a suitable ink system – allows the production of a mirror effect. This mirror effect is only possible in connection with solvent based inks. However, in combination with special bronze preparations you can also achieve high metal gloss effects with UV-curing ink types. The main application is Narrow Web, i.e. combination printing for label production. Before metal gloss inks were developed, labels were mainly manufactured by hot stamping foil technique. Naturally this technology was costly and printing processes were quite slow. In addition quality of the hot stamping foil prints was not as good as modern screen prints, especially in respect to contour sharpness.

Information about use of Gold Bronzes

In addition to the possibility to adjust colour of aluminium bronzes to a gold shade (as already described above) also so-called gold bronzes, gold pastes and gold powders are often used. Depending on the mixing ratio you will have copper and zinc, pale gold, rich pale gold and rich gold, partially even copper. The disadvantage of these pigments in printing inks is their susceptibility to strongly oxidise. Metal bronzes will oxidise quickly and surfaces will be come unattractive. Therefore so-called resist bronzes are used for printing of outdoor resistant, chemical resistance bronze colours. These are copper/zinc bronzes with retarded surfaces. However, the disadvantage of this retardation is that gold and copper surfaces will not be brilliant.

PEARL GLOSS PIGMENTS

Gloss of pearls is always a quite fascinating effect therefore this material is predestined for the production of jewellery. Naturally there is also a high requirement for printed reproductions of these effects. Glimmer, a natural mineral is used for the production of pearl gloss pigments. This glimmer is the carrier material which is encased with one or several layers of metal oxides.

Typical pearl gloss is originated by reflection of light at the thin pigment layers. In this process overlapping of various reflected rays will result in a so-called interference and the reflected light shows in different shades of colours. The effects of these interference pigments are also taken advantage of in the production of safety features of documents and banknotes. Such effects are also called colour shift effects.

Processing silver bronzes, gold bronzes and pearl effects can nearly be done in any printing process. However, taking advantage of all possibilities of the use of coarse pigment structures, for reproducible prints you will always choose the screen process. Currently digital and screen technology are used for process prints. It will be a matter of cost, which of the technologies is finally used to print the orders. However there are no alternatives for decorative and effect prints as the screen process offers the broadest product range. A combination of screen printing and other printing processes, such as the current combination of screen and Narrow Web, will become increasingly important for graphic applications.