

Harald Tröger
[Laboratory: Pad Printing]



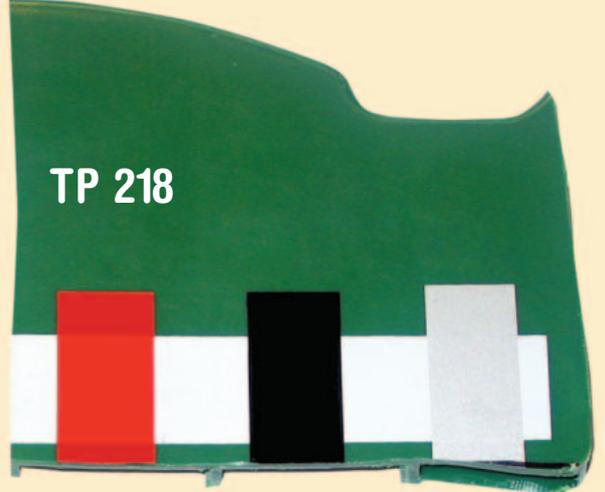
LIGHT AND WEATHER RESISTANCE OF PAD PRINTING INKS

Before



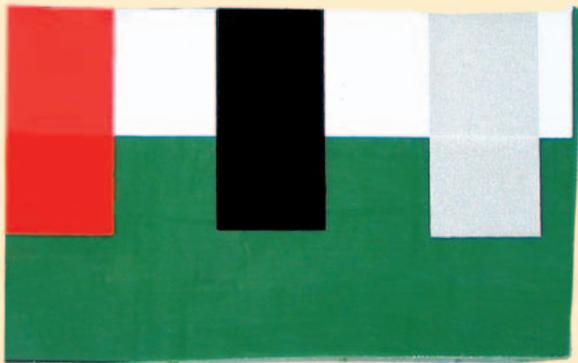
TP 307

Before

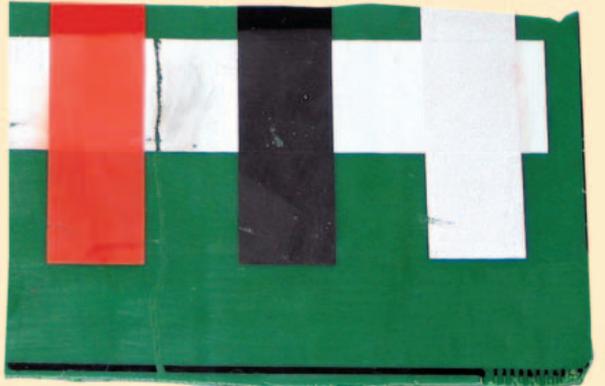


TP 218

After



After



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Pad printing technology is used for decoration or coding of many articles. In the past, however, light and weather resistance of pad printing inks was more or less a second priority topic. On the other hand an increasing number of customer inquiries for ink systems exhibiting these properties confirm the importance of that subject. There is an increasing demand, especially by the automotive industry for pad printing inks with a good light and weather resistance – no matter if the inks are used for decoration of interior automotive parts or whether they are used for printing of logos attached to the outside car body.

It's the dry layer thickness of 5-7 µm, which makes it difficult to meet these requirements. Time consuming and continuing development is essential to achieve good resistance values. The basic precondition for formulations of light and weather resistant ink systems is a careful selection of raw materials.

This is the only way to develop outdoor resistant pad printing inks meeting the increasing requirements of our customers.

■ PROPERTIES

Many people assume that all 2-component printing inks show a very good light and weather resistance, because after adding the hardener there is a chemical reaction between ink and hardener. That however is not the case! Outdoor resistance of pad printing inks depends on the binding agent system and the pigments contained in the formulation. Thus correspondingly formulated 1-component inks can show better outdoor resistance values than 2-

component ink systems. The reason for this is the chemical structure of the individual components contained, as certain substances tend to change if subjected to weather influences or high doses of UV-radiation.

This again will result in quality reduction such as colour shift, gloss reduction, chalking and even bubbles, tears or loss of adhesion.

■ POSSIBLE TEST METHODS

You will have reliable results of weather resistance tests if test climate corresponds to the practical conditions of use as that way as many climate related elements as possible can be taken into consideration. Therefore test stations are available in different climate zones. Important testing stations are at the North Sea (salt containing air), in the Ruhr region (industrial climate), in the high mountain region (increased UV-radiation), in Florida (tropic climate) and naturally, also the region, where the printed parts will be used later. All these environmental influences will have different influences on the prints.

Natural weather testing requires a lot of work and time. To shorten this process there is the possibility to carry out artificial weather testing with various ink systems. The laboratory of Coates Screen has a Q-Panel equipment, which can be used to test UV/A and UV/B radiation separately.

During this test UV radiation (UV/A or UV/B) is changed every four hours. The equipment has a relative humidity of more than 90% and a temperature of 40°C thus simulating the Florida test (tropic climate). Tropic climate will be especially harmful to delicate prints. The change of high dosage UV-radiation combined with hot, humid air will significantly decrease

printing quality such as change of colour, bubbles or chalking.

Naturally such artificial weather tests are much more intense than natural weather influences. A print being tested in the Q-Panel for two months without showing any changes will have an outdoor resistance of 2 years (+/- 50%).

■ EVALUATION

There are various methods to evaluate changes of prints. For evaluation of light fastness (which always refers to the pigment) there is the wool scale. The exposed specimen is compared to the wool scale; light fastness according to wool scale ranges from 1-8. 8 is a very high light fastness – i.e. no colour changes at all - and 1 is very low light fastness – i.e. significant colour change.

The so-called grey scale is used to evaluate weather resistance. Values are 1-5, 5 being very good and 1 being very poor. Evaluation process is similar to that of the wool scale.

Raw material manufacturers often use these values for their products, however then they only refer to one individual pigment. Therefore it is often necessary to carry out these time consuming tests to obtain reliable results for a formulation.

The Coates Screen Inks GmbH laboratory has already developed pad printing inks with good to very good weather resistance values.

For example TP 307, a light and weather resistant alternative of TP 300, which is mainly used for printing of automotive logos.

- ① Comparison of TP 307 and TP 218 before and after weather testing in the Q-Panel
- ② Q-Panel weather testing equipment
- ③ The interior of our Q-Panel weather testing equipment

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