INFRARED SPECTROMETER ACCESSORIES

Simulated Long Term Storage Condition Block Test for Ink Transfer and Film Adhesion Properties on a Flexographic Printed Film – Part 1

Introduction

Printing and ink industries are among the oldest established industries dating back to the 18th century with the introduction of the letter press. The printing industry has evolved considerably over the years with the introduction of new printing methods such as flexographic, gravure and lithographic printing on a variety of treated films and papers. The ink industry has responded extremely well to the changes within the print industry, supplying an exciting complexity of shades and types of inks to match the variations of printing processes and materials.

Plastic film wrap is a universally accepted form of sealing commercial goods, especially in the food and pharmaceutical industries. With increasing competition among manufacturers, packaging of products with consumer appeal has become more important. Printed defects on packages which detract from customer appeal can be eliminated by careful fabrication of ink and treated films.

The ink blocking test evaluates the adhesive properties of inks on the substrate. The use of a Specac hydraulic press (Fig.1) and heated platens with automatic temperature controller enables simulation of life time storage conditions to be carried out on printed film. The flexographic printing process is commonly used for film printing because it is quick and relative cheap in terms of design changeover.

Figure 1: Specac's Hydraulic Press

Experiment

A commercially pretreated polyethylene film was used in this experiment. The treatment process normally involves treating one side of the film with additives (eg. polyvinyl dichloride or acrylic

coating) and further subjecting it to high voltage corona discharge treatment to make the coated face receptive to ink bonding. Four 18 inch lengths by 2 inch wide pieces of the flexographically printed film were cut and rolled up around a former (eg. pencil) with ink against the untreated surface and the former removed. The four rolled pieces were placed evenly on the heated platens and a pressure of 5 tons was exerted by the hydraulic press for 2 hours at room temperature (it is important to use at least four rolled pieces to ensure an even pressure across the platens and samples). On removal, one sample was unrolled and checked for blocking, another one was tested 1 hour later after the sample had undergone "relaxation". The experiment was repeated with 6 and 7 ton pressures.

Specac's Heated Platens

Polyethylene which was treated on both sides was used with the same experimental conditions as before, so that the printed side was rolled up with the ink against a treated back surface.

Results and Discussion

The ink block test is currently the most reliable and accurate method of simulating conditions of heat and pressure which printed films (20-50 microns thick) undergo during storage in various climatic conditions. The previous know methods of testing, using a block of weights or a spring gauge, had the disadvantage of being inaccurate, time consuming and lacking heat testing.

The tested films showed that the printing did not affect the film release either immediately or after film "relaxation". Where films are stored in large rolls for several months in different climatic conditions, the ink block test gave a good indication of the expected film behaviour with respect to ink adhesion and ink transfer properties. For printing or storage in hot climates, the platens temperature can be controlled to simulate the appropriate conditions.

The good results of the ink blocking test were feasible due to precise matching of ink and treated film properties. Failure to match the properties of the two components would result in ink transfer from the printed side to the unprinted side of the film and –or film adhesion to itself. Polyethylene films and low melting point/low density films are tested at lower pressures, as they tend to flow at high pressures. By gradually increasing the pressure, the critical blocking point can be ascertained.

In practice, the pressure at the center of a rolled polyethylene film is lower than the equivalent size polyolefin or most other synthetic films, were ink blocking test can be evaluated in a similar manner.

Conclusion

The Specac hydraulic press and heated platens with digital automatic temperature controller are ideal tools for simulating long term storage conditions on printed films. Films printed by the flexographic method will perform well in printing and packing plants in various climates. This results in enormous financial benefits.

The ink block test may also be extended to cover printing of paper by lithographic process. Other applications include investigation of the condition of books and journals stored for long periods in stacks in libraries and factories.

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