

AN ASSESSMENT OF DIGITAL AND TRADITIONAL FLEXOGRAPHIC PRINTS QUALITATIVE PARAMETERS

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Abstract

Recently, the flexographic printing quality is constantly improving. Areas of application and possibilities of flexographic printing are growing. Flexographic printing is mainly used for the production of labels and packaging. Recently, smaller print runs are printed using digital flexographic printing, in order to fulfill customer orders as soon as possible. Digital flexographic press can be printed on almost all materials, on which can print and traditional flexo printing.

In this paper was tested traditional colors ΔE color differences of digital and traditional flexographic printing prints on different materials. The prints inks adhesion to the printable surface properties was also analyzed. It was found that digital flexographic printing prints color and characteristics of the inks adhesion to the printable surface did not differ from the traditional flexographic print.

Keywords: *digital flexographic printing, press fingerprint test, color difference ΔE , ink adhesion*

Introduction

Printing quality is one of the most important parameters for each manufacturer. Starting with the color accuracy and restoration of finishing inks anchoring and persistence on the surface of the product. Since the perception that digital printing is more precise in their work, in this research work was intended to verify this fact. And explore the flexographic and digital printing quality differences on the same materials.

Main goal: to investigate the flexographic printing qualitative parameters. Objectives: to perform color comparison by ΔE 2000-year standard, to carry out a paint adhesion test.

Testing Procedures

In this study was used materials that are most commonly used in flexographic press:

- *Raflacoat* - self-adhesive high-quality coated paper for high-quality self-adhesive labels and advertising materials. Grammage of this self-adhesive paper - 80 g/m² [1].
- *BOPP film* (white and transparent). BOPP or biaxially oriented polypropylene film, which is suitable for food packaging and surround labels for the beverage industry and other production. Thickness of film - 25µm [2].

Gidue 410 traditional flexographic printing machine, with a maximum print width of 410 mm, the maximum print speed of 1200 m/min, 6 section coloring, was used to print the prints. Other research samples were printed in digital flexographic machine *Xeikon 3500*; which operation is based on the electro photographic principle. The maximum print width is 516 mm, the print speed is 19 m/min, that printing machine has 5 section of color and it can be used to print on paper, film, cardboard and other materials.

Color differences for printed samples were determined using a spektrofotodensitometer *X-Rite Digital Swatchbook*. Flexographic print color difference CIE Lab ΔE_{2000} was compared with in the ISO 12647-6 standard provided color coordinates of CIE Lab.

The investigation of ink adhesion to the printable surface was measured according to FINAT FTM 21 procedure [3] by using tape tesa® 4100, which the adhesion to steel is 2.2 N/cm [4]. The study also used tesa® 4120 tape, normally used to test flexographic printing ink adhesion to the surface of print, its adhesion to steel is 2.0 N/cm [5]. The investigation has revealed that adhesion properties of these tapes was not enough to delaminate the print. Then tesa® 4965 tape, which adhesion to steel is 11.5 N/cm was used [6].

Results of the ink delamination are presented in these surface images, which are obtained through a digital microscope DPM300; the view was enlarged 50 times.



Fig. 1. View of digital microscope DPM300

Results and discussion

The data of the measurements was used to calculate ΔE , which then was compared with the ISO 12647-6 standard CIE Lab values. The results are presented in a Fig. 2. According to the diagram it can be said that deviation is largest on BOPP white material, yellow color, but in the ISO 12647-6 standard deviation of the maximum allowed is 8. On the basis of standard we can say that the press is of high quality and meet the requirements.

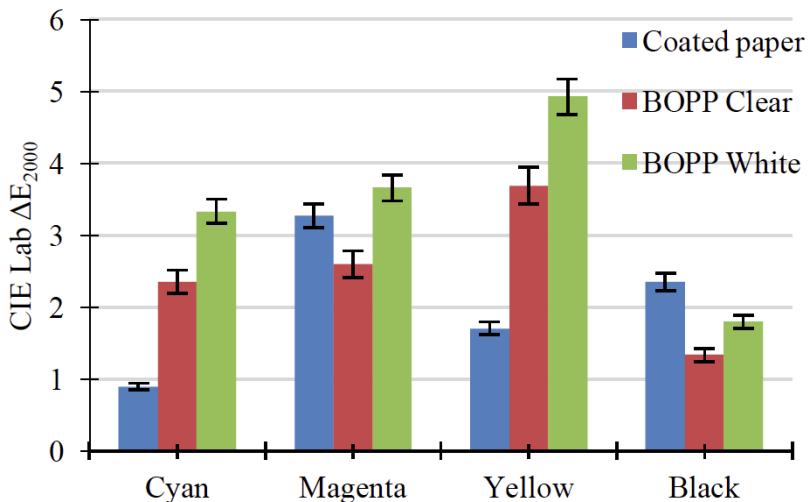


Fig. 2. Colour differences CIE Lab ΔE_{2000} between traditional flexographic print samples and ISO 12647-6 standard

Digital printing test results are less remote from the standard value (see Fig 3). Except for coated paper material, here the black color differs from a given Standard. However, do not exceed permissible limits. It can also be noted that most of the color values does not get more than ΔE 3.

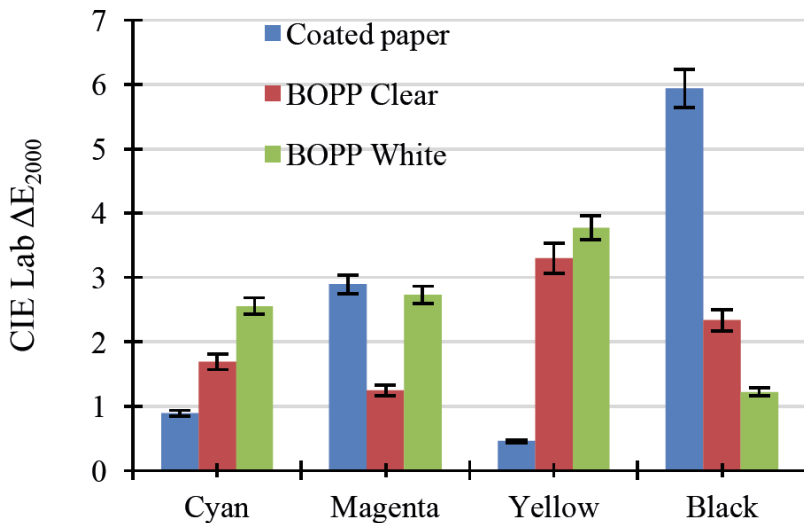


Fig. 3. Colour differences CIE Lab ΔE_{2000} between digital print samples and ISO 12647-6 standard Adhesion measurement results are showed below in Fig. 4. The presented peeled surface pictures are from BOPP transparent.

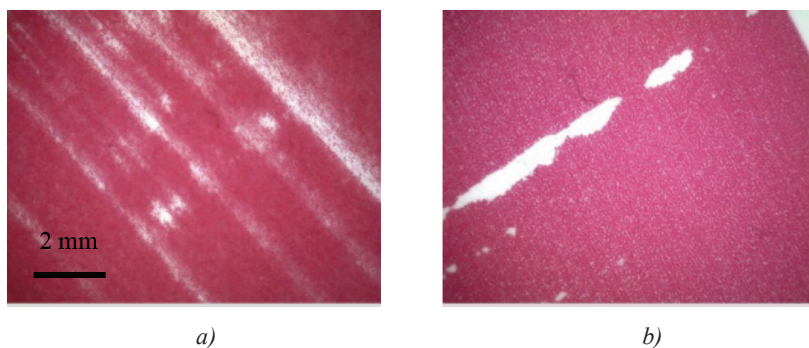


Fig. 4. View of peeled printed surfaces (ink adhesion to surface): a) digital printing sample and b) flexographic printing sample

As can be seen from the presented photos the most visible adhesion is on sample printed with digital printing. However, the flexographic printing printed sample is less, but also in exposure of adhesion.

Furthermore, by using the tape tesa® 4965, adhesion is visible with the sintered material, but it is only visible with the digital printed sample.

Conclusions

CIE Lab ΔE_{2000} measurements of the prints were obtained from a digital printing standards are more in line with the values, although it should be noted that the measurements of the flexographic printing has relatively small variation as well. The results that were obtained during the measurement, does not exceed the tolerated limits.

The ink adhesion test showed that flexographic printing ink has a greater adhesion to the printed surface. During the ink adhesion test and using suitable sticky tape results were not available. In contrast to the digital press tests, where peeling was observed in all of the samples.

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