Quality Enhancement of Images Printed on Colored Paper in Litho Offset Printing

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Abstract:

The study has been to find a solution to the problem of printing on colored paper. Due to repeat the problem of differing quality of the printed image on the white paper from colored paper to reach a solution to that problem has been conducting experiments in order to reduce the effect of the color of paper as the infrastructure layer of the printed image and by reducing the transparency of the ink. Was a positive outcome for the quality of the printed image on colored paper . The results were better when you increase the added opaque white ink to regular inks but with the large increase resulted negative results in terms of the value of the pigment within the ink may say, thus affecting the color density. He also has been the experience of another direction in order to avoid these negative result and that by printing opaque white color as the infrastructure layer of the printed image was obtained good results

Keywords :

Color density, color transparency, process inks, multicolor offset printing, ink components

Introduction

It is important to be able to print high quality image on colored paper nearest in quality of the image on white paper. The total quality of a printing machine is a very complex entity, involving technical aspects such as expected lifespan, printing speed, printed media, inks etc.

The standard inks available for forms printing are generally comprised of a pigment, a vehicle and certain additives. NCR PAPER brand can be printed with most quality inks normally used by the printer to produce business forms.

The pigment is finely ground solid particles suspended in the vehicle that impart color. Pigments also contribute to many other properties of the ink, such as specific gravity, opacity or transparency, and permanency to light, heat and chemicals. They usually determine the resistance of a print to bleed in water, oil, alcohol, acid or alkali. (7)

A vehicle is the liquid portion of an ink that carries the pigment and binds it to the paper after the ink has dried. Varnish, obtained from linseed oil, soya oil, and other blends of agra oils are the most widely used vehicle in business forms inks today. Other common oils such as cottonseed oil, castor oil and fish oil are also used as ink vehicles. A combination of certain synthetic resins with a vehicle will produce many specially desired properties.

Ingredients such as driers, waxes, lubricants, gums, starches and wetting agents are used to impart special characteristics. Driers, for example, act as catalysts to speed the oxidation and drying of the varnish. Lubricants will reduce the tack of the ink and cause it to set quickly. Additions must be carefully controlled in the pressroom, since each pigment-vehicle combination will behave differently. It is advisable that the ink manufacturer be consulted before altering the ink.

One of the most important physical characteristics of ink in relation to NCR PAPER brand is the "Ink tack" .Ink tack is a measure of the resistance of an ink film to being split the number, such as 10 tack ink, is a value assigned to represent the force required to split the ink film. If the force required to split the ink film is greater than the force required to pull the coating from the base paper, the coating material will be physically picked from the sheet.

The coating that is removed from the paper can build up on the blanket, plate or elsewhere in the inking system and create

major problems. With the wet offset process, we recommend the use of a 10 to 12 or lower tack ink, based on a GATF inkometer reading at 800 rpm. If using the dry offset process, we have found a 5 to 7 tack ink works better. Inks with a higher reading can create problems. Care should be taken to assure stripe settings are at manufacturer's specifications. We recommend that ink be used "straight from the can." However, if a reducer is needed, we suggest that you contact your ink supplier for specific recommendations. (6)
The use of a non-compatible tack reducer can cause offsetting in the roll, ink bleeding through the finished form or failure of the ink to dry.
A subject closely related to tack is ink stability. Ink stability is the ability of the ink to maintain its physical and chemical properties throughout the inking system until it reaches the paper. Changes in the stability can be created by contact with the atmosphere, when the film is split, or by water logging.
If the ink lay down is not of the best quality, the back cylinder pressure may have to be increased to help create a better image. In doing this, however, care must be exercised not to create too much pressure on the paper as this could cause damage to the pressure sensitive capsules of CB, CFB and Self Contained. If back cylinder pressure is changed, use Instant Replay II to check for capsule damage.
Transparency refers to the ability of an ink film to transmit and absorb light without scattering. The transparency value that is expressed (T value) is a measure of the unwanted light scattering. (1)

Research problem

In our local market there is not ability to print on colored paper and there is a big difference between the image on white paper and the image on colored paper.

Experimental Work

Materials:

This paper examines the printing quality of a given design on two kinds of paper, using fixed parameters, as follow;

- The experiment was carried out in film-based workflow. A test of Digital Four Color Test target was output by using Hahrlquene AM technology. Due to excessive Tone Value Increase (TVI) during the plate creating process, the film output was adjusted to achieve linear plates.
- Heidelberg GTO 4 colors printing machine, as shown in figure (1),

Figure 1: Offset printing machine – 1986

- one specified type of cold set inks (*True Ink, manufacture in China*),
  - The tack value of ink (32 c) according to technical data sheet of used ink was,
    - process magenta = 10-12,
    - process yellow=9-11,
    - process cyan=9-11, and
    - Process black= 10-12.
    - Opaque white ink
- dampening solution (*Sappi*)
  - pH=4.8 – 5.2,

- temperature= 12 c,
- conductivity value= 800 µs/cm,

- constant balance between ink and water, pressure value and speed,
- three types of uncoated paper(white paper - brown craft paper
- (recycled paper) 80 gsm, the paper size used was A4 ,
- the surrounding environmental condition "22-25 c" , (3)
- Designed test form, To carry out our color image quality evaluation, we first designed test target. the resolution 2540dpi, 175lpi, and the file format PDF. (2) The target shown in Figure 2 was specified using CMYK color space. The targets contain several graphical and pictorial elements which were used for our quality evaluation.
- Automated pressroom reflection densitometer (DensiEye 700, which include a polarization filter), as shown in figure 3.

Figure 2: The CMYK test target designed for our study

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Figure 3: X- Rite DensiEye 700

Procedure

1. printing on white paper, by using printing inks density was measured
2. The same design was printed on colored paper with the same installation of all the factors of the type of ink and collect on the machine operating conditions then

all values were measured in terms of colorimetric ink density was measured

3. Printing on colored paper with adding ratio 25% of opaque white ink to the proportion printing inks all samples was printed with the installation of all the other factors in the experiment in terms of colorimetric ink density was measured
4. Printing on colored paper with adding ratio 50% of opaque white ink to the proportion printing inks all samples was printed with the installation of all the other factors in the experiment in terms of colorimetric ink density was measured
5. Printing on colored paper by adding special color white opaque under printed area and then the design was printed using printing inks without adding opaque white to inks were then measuring densities values

Results

Measuring the effect of adding opaque white ink to printing inks through three trials and measuring the effect of printing a layer of opaque white under printed without any additives we have been clarified through the values of the five results indicated

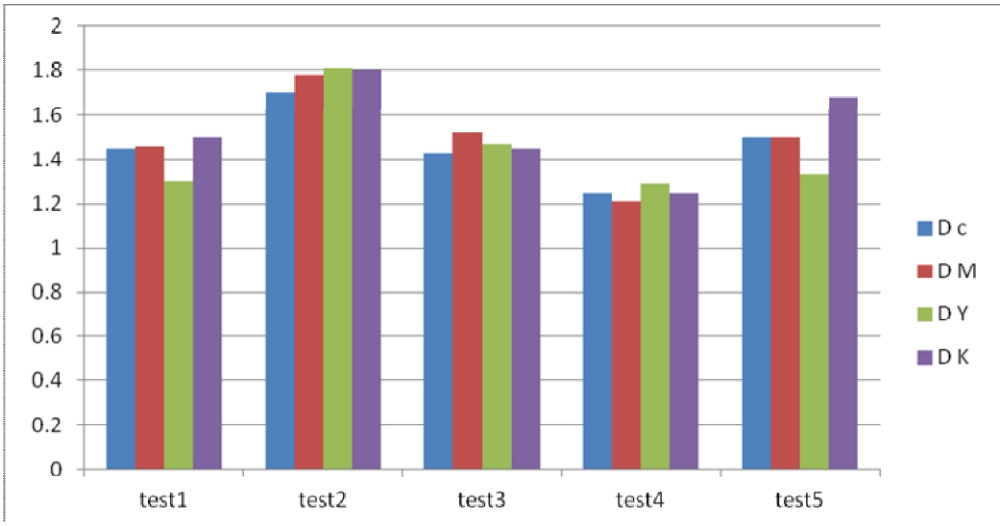

Figure (4)

Table (1)

	D K	D Y	D M	D C
test 1; white paper	1.5	1.3	1.46	1.45
test 2; colored paper	1.8	1.81	1.78	1.7
test 3; colored paper with 25 % opaque white	1.45	1.47	1.52	1.43
test 4; colored paper with 50 % opaque white	1.25	1.29	1.21	1.25
Test5; colored paper with under layer opaque white	1.68	1.33	1.5	1.5

1. When adding opaque white to color printing inks and added ratio was 25%, we got a better result in terms of color values as well as values of density of colors (as shown as in table 1 test 3)
2. with increase the percentage of addition of opaque white ink to printing inks and the ratio was about 50%, the result differed as color density ratio (as shown as in table 1 test 4)
3. printing and using the opaque white color as the infra structure layer of the printed design and use of inks without additions, we got a better result in terms of color and density values (as shown as in table 1 test 5)
4. There is an expectation in second result to increase the proportion of white opaque where he must increase the proportion of the pigment inside the original ink component to the compensation increase in the proportion of White added, as well as reduce the percentage of transparency of the ink

used to reduce the effect of the paper printed on

Conclusions:

A specialist can get a high picture quality on colored paper by adding opaque white inks to printing CMYK inks . Amount of pigments in inks should be increased the to avoid reducing the density values. Also the same can be achieved by printing a layer of opaque white under the printed image so that the white layer reduces the effect of color paper.

References

1- A Guide to Understanding Graphic Arts Densitometry, X-Rite.

2- ISO 12647-1 (2004). Graphic technology — Process control for the production of half-tone color separations, proof and production prints —Part 1: Parameters and measurement methods.

3- ISO 2846-1: 2006, Graphic technology — Color and transparency of ink sets for four-color-printing —Part 1: Sheet-fed and heat-set web offset lithographic printing.

4- ISO 12647-2: 2004, Graphic technology — Process control for the production of half-tone colour separations, proof and production prints —Part 2: Offset lithographic processes.

5- Color & Quality Expert Guide- www.heidelberg.com

6- Paper Standards & Measurements- www.sappi.com/KnowledgeBank

7- Paper, Ink and Press Chemistry Exploring key print variables

8- www.sappi.com/KnowledgeBank