

## **Using the technology of separating the seven colors (Prinect) as a substitute for Pantone colors in the printing and packaging industry for its economy and improving the quality of the Final publication**

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### **Abstract:**

printing packaging industry is one of the leading industries on which many depend, and then there have been many researches and developments regarding this subject, especially in the production of high-quality colors to attract consumers. Products and trends have always been printed using basic colors and also Pantone colors, especially in the field of packaging, in Pantone color system, it is difficult to obtain the same tones by the client because the Pantone colors when mixing can produce an error rate, as well as the high cost of buying inks, it became necessary to resort to a technique that helps us a lot in harvesting the same colors with high quality and at a lower cost, so that this does not reflect on the selling price of the product in the market or reflect on the competition. Which led to the emergence of a new technology that facilitates to obtain a color range similar to the Pantone colors, but in an easier way and lower costs using the technology of Brink seven color system, a system that uses the basic colors CMYK in addition to three other colors which are orange, green and blue.

The three colors are from the group of the 14 basic colors of the Pantone system, which were selected from this group and added to the four main colors CMYK to expand the color range to get the idea of the 7 colors and a total of 14 colors, which includes orange, green and blue, cannot mix any of them and are being Manufactured each one with binging then being put directly in the packaging, the delivery of the customer, as the Pantone system works in two ways the first way to choose a color from the total of 14 such as the choice of orange, and in this case the customer buys this color in the required quantity and ends up with the second way to choose a color of the total of 4300 colors and in this case color must be mixed with proportions of the total of the 14 basics and this second method is that the system of the 7 colors to end its work. The color separation in this technique is developed by programs that separate the design into seven printing colors. Brink technology requires an integrated system consisting of several phases linked by application programs for each stage of production from the design phase through color separation and montage to the final product delivery, this system is managed using artificial intelligence, which performs calculations and measurements to control color values and compare them with ISO standard values, analyze results and correct errors, to bring the product to high quality.

### **Key Words:**

Pantone Color - Prinect - EΔ Color change rate.

## Introduction

The printing, packaging and packaging industry is one of the most important supporting industries in the field of printing, which many depend on locally and globally, and in order to continue to progress in the packaging industry and prosperity to cope with the needs of the market, there has been many technological developments to enrich this industry by introducing many colors, which is an important attraction to sell products.

The printing industry has resorted to the Pantone Graphics System, which requires a lot of equipment and skills, which puts an additional burden on the printing presses in terms of cost and time, so the so-called (Prinect Multi Color) technology appeared in seven printing colors that provide a flow database and integration of production work , Which provides the highest level of operation, because this technique was able to control the administrative and technical process of printing, where the production of high-quality color and purity because the color range uses this technique increased the number of hues that can be obtained on the printed chick.

## Research Problem:

- 1- The high cost of printing using the Pantone system, which became a burden on the owners of the presses, which is reflected in the high production costs and consequently the price of the product.
- 2- Is it possible that Prinect technology be used to reduce the number of special colors in the Pantone system? Which saves cost and gives a higher print quality.

## Research aims:

Shortening the number of colors used in the system of printing special colors ((Pantone color System to (7 colors).

- Reducing the cost of energy consumption and the percentage of error that can occur as a result of mixing colors to obtain the required color tones of the design, as this requires the presence of ink mixers, and measurement coefficient requires high efficiencies to reach the tones required by the client and this is reflected on the sale price of the product in the market and the competition.

## Research importance:

- Lower production costs through the use of technology will help to achieve competitiveness between the printing presses and the external market.
- Saving time, effort and costs of access to special grades (Pantone color).

## Research methodology:

The study follows the experimental method by conducting comparative experiments to ensure the effectiveness of the seven-color Prinect technology compared to the system of producing colors for the same efficiency and quality.

## Research limitation:

### Theoretical framework:

Includes a description and analysis of the stages of production of using the technique of color separation seven color Prinect Multi Color. A practical experiment for a printed production that is printed with this new technique is described.

**Applied Framework:**

Experiment to measure the rate of color change to clarify the difference between the result of printing in color Prinect Multi Color separation, seven color and Pantone Graphics System (Pantone Graphics System) using a measuring device. X-Rite exact.

**Pantone color System Definition:** A system that defines a Standard value for colors used for printing and other uses of color, ensures that the color does not change either on screens or printed on any type of surface. Pantone is defined to give specific colors by giving each color a specific code or name that is referenced to get the desired color.

This technique uses an integrated system of programs to ensure the arrival of the final product with the desired quality and the lowest price, where obtaining the same color quality required by expanding the color range, as in Figure (1) thus eliminating the problems resulting from Pantone color and thus reduce cost and maintain quality that is reflected positively on the sale price of the final product.

**Prinect multi-color**, the system can be defined as an integrated system of software covering the needs of printing companies began from the administrative processes (stores / pricing / management control) pass through the production stages (editing programs / color separation programs / color management programs ICC color profile / CTP / machine drivers Printing machine drivers (and even final product delivery).

• **The stages** of production of printing using the system Prinect Multicolor from design to delivery of the final product are as follows:

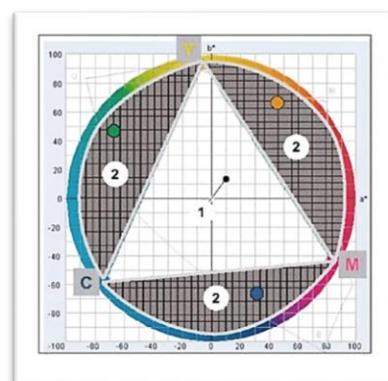
First: is calibrated paper that will be used in the printing production is it glossy paper / stretch / covered / not covered..... Where we go to one of the files calibration specifications ISO 4 color for example on glossy paper and then we make a copy of them and rename with another name for example seven color.

Second: Calibration file is created within the system as determined by ISO 12647-2, where the program comes equipped with calibration files for the work of 4 colors and this file contains the standard color values set by the manufacturers and producers of color management programs and among these values (ink density, dot growth, color error ratio), also creation of three colors of the group of 14 (Pantone) namely (Orange – Green –Blue) form ( ) and thus we have a standard for operation, 7 colors.

After calibration and adding the tricolor, the file is ready for operation and is inserted into the production stages as follows:

1- Program of montage Prinect Signe Station (In this program the control bar is printed with standard color values) Prinect Prepress Manage (Is a program that manages and handles files from design errors for example overprint) - Prinect Meta Dimension (Is a program that separates the color 7 colors according to the standard values.

Prinect Color Proof Pro (Inkjet printer is used for proof) Prinect Pressroom Manger L Pressroom Interface Speed master with Prinect press center Color separation data is sent to the machine control unit to adjust both printing pressure / ink density / speed). Prinect Image Control (It is scanning the printing color to discover its errors and address and correct them.



**Applied framework: Applied study** in the applied study, the X-Rite exact Figure (2)

spectrophotometer was used to measure the rate of color change ( $\Delta E$ ) in both Pantone and seven colors on a sheet of paper printed with the Control Bar printed in standard values, and color values corresponding to Pantone values (specified by numbers). Printed with Prinect 7 colors and a selection of different designs and prints (books / magazines / packaging).

To make the measurement experiment, four basic colors were printed in addition to the three added colors that make up the Prinect 7 color technology. The researcher will present the results of printing paper and printed colors and determine the rate of color change.



Figure (2) X-Rite exact

The results of color change are shown when printing the pantone grades with Prinect in 7 colors as in the following table

* 2.74 $\Delta E$	<b>PMS 576</b> 	* 1.76 $\Delta E$	<b>PMS 158</b> 
* 2.74 $\Delta E$	<b>PMS 576</b> 	* 3.40 $\Delta E$	<b>PMS 1665</b> 
* 2.22 $\Delta E$	<b>PMS 271</b> 	* 2.74 $\Delta E$	<b>PMS 711</b> 
* 2.96 $\Delta E$	<b>PMS 273</b> 	* 0.66 $\Delta E$	<b>PMS 208</b> 
* 3.97 $\Delta E$	<b>PMS 258</b> 	* 4.62 $\Delta E$	<b>PMS 326</b> 
* 3.00 $\Delta E$	<b>PMS 268</b> 	* 4.22 $\Delta E$	<b>PMS 556</b> 

It is noted from the table that the rate of color change is within the limits (1-5), which is the limits of the tolerance according to the standard produced by ISO 12647-2.

### **Results: The study reached the following results:**

- 1-The ability to print the color range of Pantone colors through the seven-color Brinkt technology.
2. The practical study proved the advantage of applying the new technology Prinect Multi Color in the printing presses due to the results presented by the study of the color quality results from Pantone colors, when applied in the production of booklets, magazines, cards or packaging containers of medicines and food containers or Publications of any different types.
- 3- The practical study proved the advantage of applying the new technology Prinect Multi Color in the printing presses due to the results presented by the study of the color quality results from Pantone colors, when applied in the production of booklets, magazines, cards or covers of pharmaceutical containers and food containers. Various types of publications.
- 4 - The results the rate of color change in Pantone degrees (PMS 158 / PMS 208) is ((0.66 - 1.76 does not exceed 1 and also at Pantone PMS 271 degrees) / PMS 576 / PMS 273 (is 2.22) - 2.74 - 2.96) does not exceed 3, that is, the rate of color deviation does not exceed the limit and thus there is no significant change between the values of Pantone colors and the same values of the colors that were printed with Prinect seven color technology.
- 5- I added this technique with high quality colors, by expanding the color range using this technique.
- 6-The use of Prinect Multi Color technology provides the presses without the expected error rate when mixing colors in the Pantone system to reach the tones required by the client.
- 7- The use of Prinect Multi Color has an economical effect in lowering production costs, as this technique provided the opportunity to ration the number of used colors.

### **Recommendation:**

#### **Based on the results of the study, it is recommended that:**

- 1- The application of Prinect Multi Color technology in many products due to the high color results of the study reflected positively on the quality of the publication.
- 2 - The activation and application of the new technology Prinect Multi Color is inexpensive as the subject needs only software programs to apply the system in the length of the printing process.
- 3 - The use of the complete system of printing production leads the market of artificial intelligence technology to develop to ensure the automation of operations in the field of compliance to produce high quality of publications.

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