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PRINT QUALITY GAP BETWEEN GRAVURE AND FLEXOGRAPHIC PRINTING PRESSES ON FLEXIBLE PRINTING SUBSTRATES

Deepak Kumar[1]

1. Faculty, Guru Jambheshwar University of Science and Technology, Hisar.

ABSTRACT

The print quality gap between flexography and gravure printing processes on flexible printing substrates is a critical concern in the realm of printing technology. This study aims to comprehensively analyse and compare the key factors influencing print quality in both flexography and gravure printing methods on flexible substrates. Through a detailed examination of parameters such as Solid Ink Density, Print Contrast and Dot Gain, this research identifies the strengths and weaknesses of each printing process. By addressing these aspects, the research aims to provide insights into narrowing the quality gap between flexography and gravure printing on flexible substrates, offering valuable guidance for enhancing print quality in the industry.

KEYWORDS: - Flexography, Gravure, Solid Ink Density, Dot Gain, Print Contrast, Flexible Substrates, Quality gap.

INTRODUCTION

Gravure and flexography are prominent printing processes widely used in the production of various printed materials, including packaging, labels, and more. Each method offers distinct advantages and characteristics, catering to different requirements in the printing industry.

Gravure printing, also known as rotogravure, involves engraving an image onto a cylinder, typically made of copper, which is then inked and pressed onto the printing substrate. This process excels in high-volume printing, delivering exceptional image quality and consistency. Gravure printing is often favoured for long print runs and high-quality image reproduction due to its ability to produce fine details and vivid colours. On the other hand, flexography, commonly referred to as flexography printing, employs flexible relief plates to transfer ink onto various substrates. This method is known for its versatility, accommodating a wide range of materials, including non-porous surfaces like plastic, metallic films, and corrugated cardboard. Flexography is ideal for shorter print runs, offering quick setup times and cost-effectiveness, particularly in the packaging industry.

Both gravure and flexography printing presses have undergone technological advancements to improve print quality, efficiency, and sustainability. Understanding the distinct features, advantages, and limitations of these printing processes is crucial in determining the most suitable method for specific printing requirements.

A number of research work has been already carried out between gravure and flexography to find out the quality gap. Various print quality attributes taken into consideration are Solid Ink Density, Dot Gain and Print Contrast. These attributes can help the printers significantly to make a healthy print quality gap between above mentioned presses.

RESEARCH OBJECTIVE

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There is a point of strong concern among the printers and customers regarding the quality gap between gravure and flexography presses. For the better understanding of the print quality gap some of print quality factors has been taken to make the print-edge quality comparison. Objectives of this paper is to find the quality gap between gravure and flexography printing technologies by densitometric method.

RESEARCH METHODOLOGY

A master test chart was prepared with the help of line drawings, continuous tone, solid images and tint patches of cyan, magenta, yellow and black. The test chart was printed with the help of gravure and flexography printing presses available in the local market. Further the print quality attributes i.e., Solid Ink Density, Print Contrast and Dot Gain tested with the help of Spectro-densitometer available in the department of Printing Technology GJUS&T Hisar.

DATA COLLECTION & ANALYSIS

Table 1. Solid Ink Density

	Cyan	Magenta	Yellow	Black
Gravure	1.32	1.35	0.96	1.57
Flexography	1.21	1.24	0.87	1.46

It is observed in the table 1, that the values of solid ink density (a densitometric print quality attribute) of gravure printing process are on higher side when it compares to the flexography printing process. The solid ink density values of flexography are 1.21, 1.24, 0.87 and 1.46 on Cyan, Magenta, Yellow and Black respectively which are lower than values of gravure (1.32, 1.35, 0.96 and 1.57) on Cyan, Magenta, Yellow and Black.

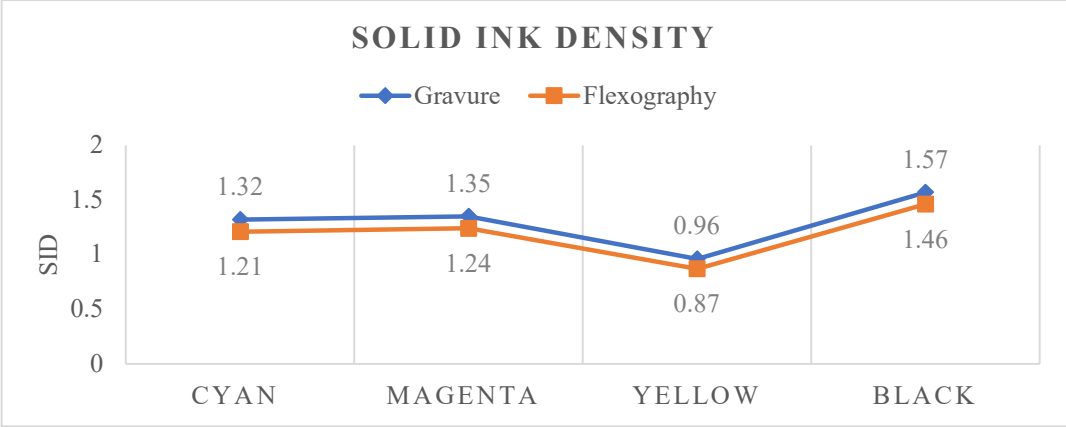

Figure 1. Comparative analysis of Solid Ink Density on Gravure and Flexography presses

Figure 1 is a graphical representation of collected data one of the most valuable densitometric print quality attributes of print quality check. And it is found that the solid ink density values of gravure printing process on the higher peak as compare to the flexography printing process.

Table 2. Print Contrast

	Cyan	Magenta	Yellow	Black
Gravure	38	37	32	41

Flexography	33	31	27	36

Table 2 represent the Print Contrast values are on higher side in gravure printing press i.e., 38, 37, 32 and 41 on Cyan, Magenta, Yellow and Black respectively but on the other hand these values are 33, 31, 27 and 36 on Cyan, Magenta, Yellow and Black in flexography printing process. On yellow there is lowest print contrast values (32 and 27) on both of the gravure and flexography presses.

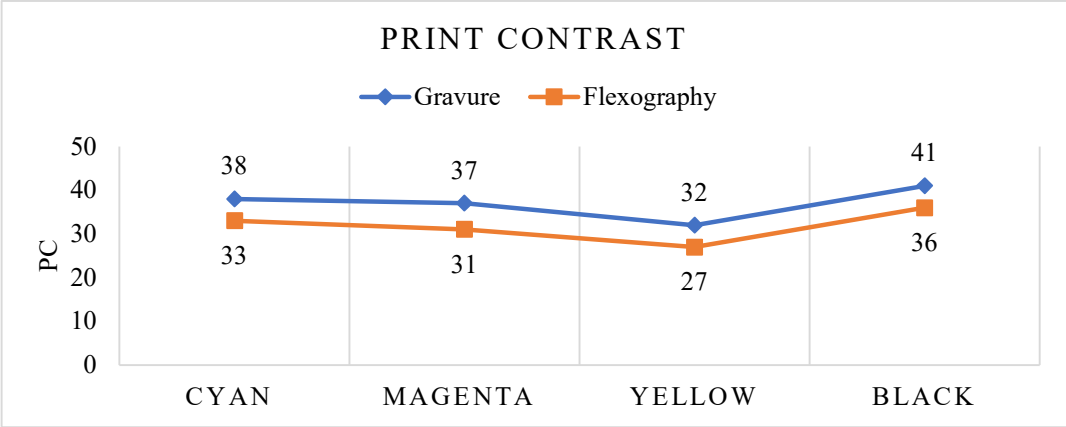

Figure 2. Comparative analysis of Print Contrast on Gravure and Flexography presses

Figure 2 is represented that the print contrast is higher in gravure printing press compared with flexography printing press and on black there is the values of print contrast on highest peak in both (gravure and flexography) of the presses.

Table 3. Dot Gain at 50%

	Cyan	Magenta	Yellow	Black
Gravure	13	14	12	16
Flexography	17	19	15	22

Dot Gain is a densitometric print quality attribute which playing a major role in print quality attributes and when this attribute was compared on gravure and flexography printing processes it was found that the flexography printing process is slightly higher side. It was represented in the table 3 that in case of the gravure printing press the values of dot gain on lower side i.e., 13, 14, 12 and 16 on Cyan, Magenta, Yellow and Black. On the other hand, in the case of flexography printing press these values are 17, 19, 15 and 22 on Cyan, Magenta, Yellow and Black respectively.

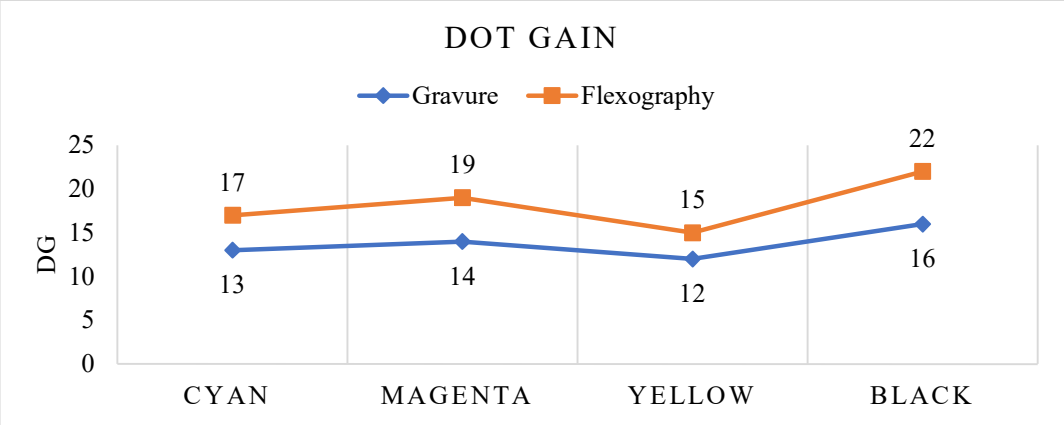

Figure 3. Comparative analysis of Dot Gain on Gravure and Flexography presses

Comparative analysis of dot gain is represented in figure 3 and it is found the dot gain values of flexography are on the higher side compared with the gravure printing process.

RESULTS & DISCUSSION

Solid Ink Density Analysis

Solid ink density refers to the measurement of the density or concentration of ink once it's printed in a solid, opaque area without any halftone dots or gradations. It is a crucial parameter in the printing industry, particularly in processes like flexography and gravure printing. The measurement of solid ink density is typically expressed in numerical values and is instrumental in determining the richness, darkness, and color saturation of the printed material. It's usually measured using a densitometer, which quantifies the amount of light absorbed or reflected by the printed ink. It is found that the values of solid ink density are on the higher side as compared to flexography printing press.

Print Contrast Analysis

Print contrast in printing refers to the visual difference or distinction between the inked areas and the non-inked (or substrate) areas on a printed surface. It is an important aspect of print quality that affects the overall readability and aesthetics of printed materials. Adequate print contrast is crucial for ensuring that text, graphics, or images stand out clearly and legibly against the background. It's particularly essential in various applications, including packaging, labels, magazines, newspapers, and other printed flexible materials, where readability and visual impact are significant factors. It is found that the print contrast values of gravure printing press is on higher side as compared with flexography printing press.

Dot Gain Analysis

Dot gain is a phenomenon that occurs during the printing process, where the size of halftone dots printed on a substrate becomes larger than intended. It is a critical factor that affects the final appearance and quality of printed materials, particularly in processes such as offset printing, flexography, gravure, and digital printing. When an image is printed, especially with halftone screens to create different shades and colours, the dots are meant to be a specific size

and shape to produce the desired visual result. However, due to various factors in the printing process, such as ink absorption, spreading, or dot gain, the dots can become larger than they were on the original image file. It is found that the dot gain values on lower side in gravure printing press as compared with the flexography printing press.

CONCLUSION

The following points are concluded on the basis of results and discussions.

1. Solid Ink Density was found more in Gravure printing press compared with the Flexography printing presses on flexible substrates.
2. Print Contrast was found more in the case of Gravure printing press as compared to the Flexography printing presses on flexible substrates.
3. Dot Gain was found more on Flexography printing press as compared to the Gravure printing press on flexible substrates.

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