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STUDY OF INK TRAPPING IN DIFFERENT DOT SHAPES OF HALFTONE ON DIGITAL PRESS (DRY TONER ELECTROPHOTOGRAPHY)

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ABSTRACT

Electrophotography is the most complex digital printing technology. There are two types of digital printing processes i.e. Liquid toner and dry toner digital printing. In this paper, we studied about the Ink trapping in different dot shapes of halftone on dry toner digital printing. Coated paper is used for printing the sheets with different halftone dots (diamond, elliptical, square). Trapping is the technique of printing in which one ink is overlapped on another one. Ink trapping is measured in different halftone dot shapes. The collected data is represented in a meaningful way so that clear difference can be seen. Ink trapping is highest of diamond dot shape followed by elliptical and square dot shapes.

Keywords: *Electrophotography, Halftone Dot, Ink Trapping, Diamond, Elliptical, Square.*

I. INTRODUCTION

The electrophotography printing process is done in five steps that start from(1) charging a photo receptor belt or drum with a coroton or scorotron.; (2) exposure with light a laser beam is used; (3) development the latent image is converted in the real image with the help of the series of black and colored toner cartridge; (4) Transfer the toner on substrate Corotrons rollers are used to transfer the toner on the photoreceptor to the paper electrostatically using the opposite charge of toner;(5) fusing the image on substrate and last step is (6) cleaning of the photoreceptor drum or belt. Halftone is the reprographic technique that simulates continuous tone imagery through the use of dots, varying either in size or in spacing, thus generating a gradient-like effect. "Halftone" can also be used to refer specifically to the image that is produced by this process. This reproduction relies on a basic optical illusion: the tiny halftone dots are blended into smooth tones by the human eye.

II. RESEARCH OBJECTIVE

To study & analyze the effect of different halftone dots (Elliptical, Square & Diamond) on print quality factor of Ink Trapping in multi-colour Dry Electrophotography digital press.

III. RESEARCH METHODOLOGY

The master chart is made with the help of suitable tools and images according to the requirement of the research. The sheet was printed with dry toner electrophotography with different dot shapes (diamond, elliptical, square).

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Specification of Xerox® Versant® 80 Press: -

Speed	Up to 80ppm
Media Weight	52gsm to 350gsm
Media Sizes	Up to 13" *19.2"
Duty Cycle	460000
Dimensions	840mm(W) * 831mm(D) * 1212mm(H)
Weight	295kg
Copy with single-pass duplex scanning	200 images per minutes
Media Types	Coated, Uncoated, Tabs, Envelops etc.

IV. DATA COLLECTION AND ANALYSIS

Data collection is the main work of the research. The whole research was carried out at **Shree Bala Jee Graphic, Hisar**. The sheet was printed with electrophotography printing process with the different dot shapes (diamond, elliptical, square). Data collection is based on the find out the ink trapping value of every 5th sheets which is printed with different halftone dot shape (diamond, elliptical, square) with the X-Rite spectrophotometer.

4.1 Ink trapping:-Trapping is the technique of printing one ink on top of another one.
%age of ink trap = D3 – D1/D2*100
D3 is the density of the overprint solid
D1 is the solid tone density of the 1st down ink
D2 is the solid tone density of the 2nd down ink.
Ink trapping is measured of yellow, magenta color at 70%, 50% and 20%.

Table.1 Ink Trapping in Diamond, Elliptical and Square Dot Shapes

Diamond		Elliptical		Square	
Ink Trapping		Ink Trapping		Ink Trapping	
Sr.No.	%age	Sr.No.	%age	Sr.No.	%age
1	14	1	13	1	18
2	16	2	15	2	17
3	15	3	19	3	18
4	14	4	14	4	12
5	14	5	11	5	18
6	19	6	7	6	18
7	23	7	13	7	18
8	19	8	18	8	18
9	19	9	17	9	17
10	19	10	15	10	17
Average	17.2	Average	14.2	Average	17.1
max	23	max	19	max	18
min	14	min	7	min	12

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4.2 Data Analysis

Data is obtained from the printed sheets.

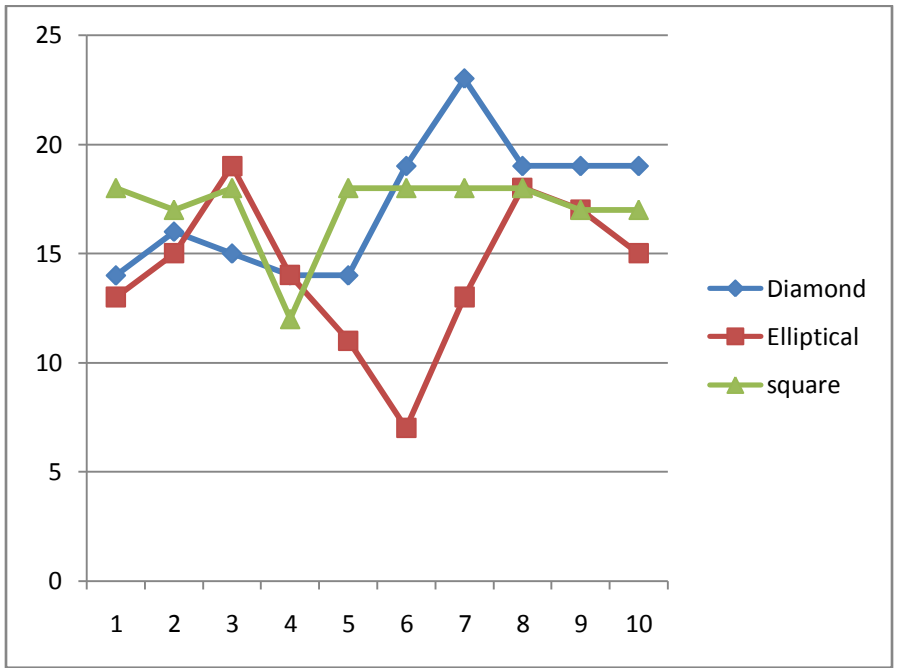

Chart.1 Ink Trapping of magenta and yellow color

V. RESULT AND DISCUSSION

Chart shows that ink trapping is high of diamond dot shape as compared to elliptical and square dot shapes. Ink trapping is lowest of elliptical dot shape.

VI. CONCLUSION

Ink trapping is a small overlap of two colors. It expresses the degree to which ink already printed on a paper. The ink trapping is highest of diamond dot shape expected to elliptical and square. Ink trapping of elliptical dot shape has lowest. And the ink trapping is moderate of square dot shape.

REFERENCES

1. *Damodar M. Pai and B. E. Springett; "Physics of electrophotography" Reviews of Modern Physics; Vol. 65, No. 1, January 1993.*
2. *Emmett Ientilucci, 1994; "Fundamentals of Xerography" February 22, 1994.*
3. *Charles B. Duke a, *, JaanNoolandi b, Tracy Thieret c; "The surface science of xerography", ELSEVIER; page no. 1005-1023.*
4. *Oittinen, P., AL-Rubaiey, H., Sipi, K. And Vikman, K.; "Research on Paper-Ink-Process Interactions in Electrophotographic and Ink Jet Printing", International Conference on Digital Production, Printing and Industrial Applications; page no.327-330, 2001.*
5. *Vince Cahill; "Introduction to Digital Printing Technology", 2003.*
6. *Seung-Jin Ryu, Hae-Yeoun Lee, Dong-Hyuck Im, Jung-Ho Choi, Heung-Kyu Lee; "Electrophotographic Printer Identification by Halftone Texture Analysis", 2010.*
7. *Vikas Sindhu, MDU, Rohtak; "A Review on Image Halftone Processing", Journal of Information, Knowledge and Research in Electronics and Communication; ISSN 0975-6779; Vol. 2, No. 2, page no.914-919, 2013.*

8. *Mahziar Namedanian, Daniel Nystrom, Paula Zitinski Elias, and Sasan Gooran; "Physical and optical dot gain: characterization and relation to dot shape and paper properties", International Society for Optical Engineering; January 2014.*
9. *Vikas Jangra, Abhishek Saini, Anil Kundu; "Relationship of solid ink density and dot gain in digital printing" International Journal of Engineering and Technical Research; ISSN: 2321-0869, Volume-2, Issue-7, July 2014.*
10. *Rossitza Sardjeva, Todor Mollov; "Study of Color Quality Uniformity in Digital Dry Toner Electrophotographic Printing", International Journal of Modern Communication Technologies & Research; ISSN: 2321-0850; Volume-2, Issue-9, September 2014.*
11. *Aman Bhardwaj, Krishan Kumar; "Effect of paper gloss on solid ink density printed with digital printing process", International Journal for Technological Research in Engineering; ISSN: 2347 - 4718 Volume 3, Issue 10, June-2016.*
12. *Ivan Pinćjer, Dragoljub Novaković, Uroš Nedeljković, Nemanja Kašiković, Gojko Vladić; "Impact of Reproduction Size and Halftoning Method on Print Quality Perception", Acta Polytechnica Hungarica; Vol. 13, No. 3, page no. 81-100, 2016.*
13. *Masayuki Kawasaki, Masaya Ishisak; "Investigation into the Cause of Print Mottle in Halftone Dots of Coated Paper: Effect of Optical Dot Gain Non-uniformity", Pulp &Paper Research Laboratory.*