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COMPARATIVE ANALYSIS OF RUB RESISTANCE IN SHEET-FED OFFSET AND DRY TONER DIGITAL PRINTING ON UNCOATED, GLOSS COATED AND MATTE COATED PAPER STOCKS

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ABSTRACT

In printing world, Sheet-Fed-offset has been popular and trending method of printing since some decades. Digital printing methods are getting popular now a days because of its quality and less production time. This paper throws light on comparison of rub resistance of sheet fed offset and digital printing process on uncoated, gloss coated and matte coated paper. To test the rub resistance a master chart was prepared consisting on line images, middle tone images and solid areas. The chart was printed by both printing processes on all above mentioned three grades of paper. The samples were tested using digital scuff tester. The results indicated that digital printing has more rub resistance compared to sheet fed offset.

KEYWORDS: Sheet Fed-Offset, Dry Toner Digital Printing, Uncoated Paper, Gloss Coated Paper, Matte Coated Paper, Rub Resistance.

INTRODUCTION

Printing is a process of reproducing text or images from a master. Modern printing is done with ink on paper with a printing press. It is also done on metals plastics and clothe etc. On paper it is essential part of publishing and transaction printing.

Offset printing is a technique in which the inked image is transferred from a plate to a rubber blanket, then to the printing surface.

Digital printing is popular method to print on demand. It usually refers to printing in which small-run jobs from desktop publishing and other digital sources are printed using large-format and/or high-volume laser or inkjet printers. Digital printing is costlier per page than more traditional offset printing, but this price is compensated which is there in offset printing preparation techniques like plate making.

Rub resistance is the property of a paper or ink by which a printed paper resists scratch, removal of ink or abrasion. Instead of quality or perfection of the printed product, a scuffed, rubbed off or scratched surface would be considered as a print defect. Because magazines, newspapers and brochures are the type of products which are handled very often, the ink on the substrate needs to be formulated to have some degree of rub resistance. By adding components such as waxes and/or hard-drying oils, an ink's rub resistance can be improved.

Coated paper is the paper in which the surface has been coated by a compound or polymer to attain some qualities like including weight, surface gloss, smoothness or reduced ink absorbency.

Gloss coated paper are the paper in which gloss is imparted on the surface and the surface has gloss finish. Matte coated papers are the papers which are less shiny. Gloss coated paper has a high sheen. Gloss papers are less bulky and have less opacity and are typically less expensive than dull & matte paper of equal thickness. Gloss coatings helps in reducing ink absorption, which give the sheet an excellent color definition.

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RESEARCH OBJECTIVES

Rubbing/Chalking is one of the most critical issues in printing because the whole printing may get spoiled if rubbing happens after printing. Uncoated, gloss coated and matte coated papers are 3 major varieties of papers currently being used as substrate in dry toner digital and sheet-fed offset printing. To know the rub resistance tendency of sheet-fed offset and ry toner digital printing on different paper grades is need of the hour. Objective of this research project is:

To compare rub resistance tendency in offset and digital printing on uncoated, gloss coated and matte grade coated papers.

RESEARCH METHODOLOGY

A test chart was prepared using high resolution images and colour control strip on it. It will be printed in offset and digital printing process available in local market on uncoated, gloss coated and matte grade coated papers of 95, 120 and 110 gsm.

The rub resistance test was conducted with the help of Rub Resistance Tester available in Paper & Ink Testing Laboratory, Department of Printing Technology, Guru Jambheshwar University of Science and Technology, Hisar.

DATA COLLECTION AND ANALYSIS

Uncoated Paper	Sheet Fed Offset	Digital Printing
Text	673	1000
Line drawings Graphics	480	782
Image	542	1001
Solid	600	950

Table.1. Rub Resistance Comparison of sheet fed offset and digital printing on uncoated paper

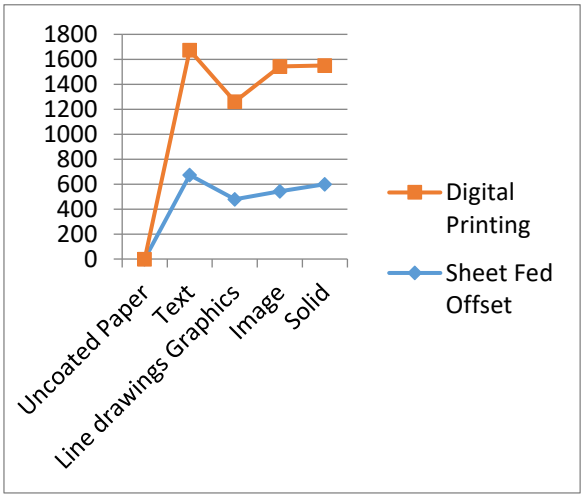

Fig.1. Rub resistance (cycles) of sheet fed offset and digital printing on uncoated paper

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Gloss Coated Paper	Sheet Fed Offset	Digital Printing
Text	310	998
Line drawings Graphics	160	661
Image	143	474
Solid	438	680

Table.2. Rub resistance comparison of sheet fed offset and digital printing on gloss coated paper

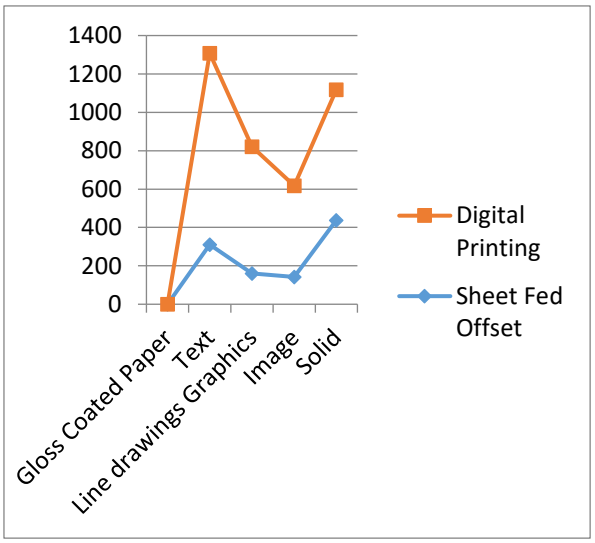

Fig.2. Rub resistance cycles of sheet fed offset and digital printing on gloss coated paper

Matte Coated Paper	*Sheet Fed Offset*	*Digital Printing*
Text	***305***	***532***
Line drawings Graphics	***158***	***394***
Image	***208***	***323***
Solid	***295***	***430***

Table.3. Rub Resistance analysis of sheet fed offset and digital printing on matte coated

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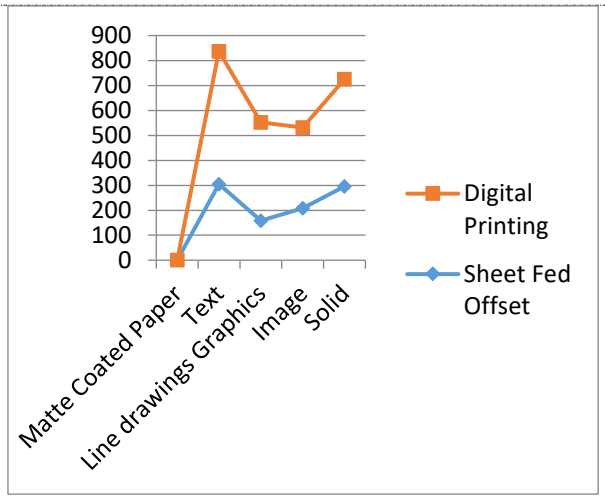

Fig.3. Rub resistance cycles of sheet fed offset and digital printing on matte coated paper

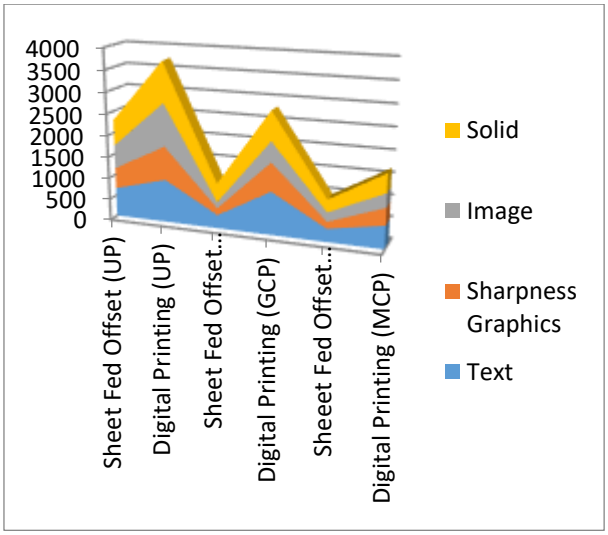

Fig.4. Rub resistance comparison of sheet fed offset and digital printing on Uncoated, Gloss Coated and Matte coated paper

RESULT AND DISCUSSION

Rub resistance in sheet fed offset and digital printing process on uncoated Paper

From table 1, Fig.1 it can be resulted that rub resistance is more in digital printing process compared to sheet fed offset. On text areas, the rub resistance in digital printing process was found 1000 rub cycles on the other hand in sheet fed offset it was 673 rub cycles. Also on solid areas the trend was same i.e. more rub cycles in digital printing process than sheet fed printing process . So it is indicated that digital printing process is far better than offset process on all the areas in terms of rub resistance. It might be due to very strong ink fusing system in dry toner based digital printing process. The vinyl particles present in dry toner besed ink melt and go quite deeper inside paper causing very strong bonding in ink and paper.

Rub resistance in sheet fed offset and digital printing process on Gloss Coated Paper

In Gloss Coated paper rub resistance the trend was found similar on whole printing process. In digital printing process the text area has 998 rub cycles weather in offset it was 310, on solid areas it was 680 in digital printing and 438 in sheet fed offset printing process.

Rub resistance in sheet fed offset and digital printing process on Matte Coated Paper

In Matte coated paper rub resistance the trend was same as the text area has 532 rub cycles in digital printing process and in sheet fed offset it was 305. So rub cycles are more in digital printing process.

CONCLUSION

- Digital printing process is better than offset in terms of rub resistance due to its ink fusing system.
- Uncoated paper exhibits far better rub resistance than gloss and matte coated grade paper.
- Text matter shows better rub resistance than solid ink areas on all types of paper than line drawings graphics, image and solid areas.

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