PRINTING DEFECTS ON RECYCLED PAPER GRADES IN SHEET-FED OFFSET PRINTING PRESSES FOR COMMERCIAL PRINT APPLICATIONS

Lalita Pannu[1]*, Ravin[2], Sumit Kumar[3]

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Abstract

Although a new variety of new automatic sheet fed offset presses are available today in market, yet vulnerability of presses towards causing various defects exist in present system. Objective of this paper is to throw light on how frequently various defects happen during press run on recycled paper stocks. The results indicated that Average sheet wastage arising due to various defects occurring in typical sheet-fed offset is 6 (+/-1) %. Dot gain, hickey and mottle are most frequently and majorly occurring defects in sheet fed offset printing organizations on uncoated paper stocks. Picking, set-off and rub-off are defects majorly arising defects on matte and gloss grade coated stocks. Tinting, scumming, slur and ghosting are independent of type of paper stocks used in printing.

Keywords: Set-off, Rub off, Hickey, Slur, Mottle, Picking, Scumming, Dot Gain, Ghosting, Tinting.

[1]*Research Scholar, Department of Printing Technology, GJUS&T, Hisar
[2]Research Scholar, Department of Printing Technology, GJUS&T, Hisar
[3]Faculty, DSEU, Pusa Campus, New Delhi

***Corresponding Author:** Lalita Pannu
***Research Scholar, Department of Printing Technology, GJUS&T, Hisar

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INTRODUCTION

Offset printing is a widely used printing technique where the inked image is transferred from a plate first to a rubber blanket, then to the printing surface. When used in combination with the lithographic process, which is based on the repulsion of oil and water. Web offset is a form of offset printing in which a continuous roll of paper is fed through the printing press. Pages are separated and cut to size after they have been printed. Web offset printing is used for high-volume publications such as mass-market books, magazines, newspapers, catalogs and brochures. In this process, the unwinding of paper reel is a continuous feeding system from feeding to the delivery part of the machine. These machines are designed into different units. Number of units of a machine is designed according to the different requirements of the nature of jobs to be printed.

Sheet-fed refers to individual sheets of paper or paperboard being fed into a press via a suction bar that lifts and drops each sheet onto place. A lithographic ("litho" for short) press uses principles of lithography to apply ink to a printing plate, as explained previously. Sheet-fed litho is commonly used for printing of short-run magazines, brochures, letter headings, and general commercial (jobbing) printing. In sheet-fed offset, "the printing is carried out on single sheets of paper as they are fed to the press one at a time." Sheet-fed presses use mechanical registration to relate each sheet to one another to ensure that they are reproduced with the same imagery in the same position on every sheet running through the press.
Sheet-fed presses offer several advantages. Because individual sheets are fed through, a large number of sheet sizes and format sizes can be run through the same press. In addition, waste sheets can be used for make-ready (which is the testing process to ensure a quality print run). This allows for lower cost preparation so that good paper is not wasted while setting up the press, for plates and inks. Waste sheets do bring some disadvantages as often there are dust and offset powder particles that transfer on to the blankets and plate cylinders, creating imperfections on the printed sheet.
Feeder system: The feeder system is responsible for making sure paper runs through the press correctly. This is where the substrate is loaded and then the system is correctly set up to the certain specifications of the substrate to the press. The Printing Unit consists of many different systems. The dampening system is used to apply dampening solution to the plates with water rollers. The inking system uses rollers to deliver ink to the plate and blanket cylinders to be transferred to the substrate. The plate cylinder is where the plates containing all of the imaging are mounted. Finally the blanket and impression cylinders are used to transfer the image to the substrate running through the press.

The delivery system is the final destination in the printing process while the paper runs through the press. Once the paper reaches delivery, it is stacked for the ink to cure in a proper manner. This is the step in which sheets are inspected to make sure they have proper ink density and registration. Production or impact of double image in printing is known as 'slur'. Variety of paper used as substrate in sheet fed offset is: lightweight, heavyweight, coated, uncoated, paperboard, cardboard, etc. Most common defects and remedies in sheet fed offset hickeys,

RESEARCH OBJECTIVES

Sheet fed offset printing is one of the major forms of printing now-a-days. Most of the developments are happening in this particular category of printing. There are numerous printing defects came in to picture while printing with this particular printing technique. The objective of the study is to:

- The primary objective is to pinpoint various printing defects that arise when using recycled papers in sheet-fed offset print production, ranging from the most frequently occurring defects to those that occur less frequently.
- The second aim is to determine the most effective solutions to rectify these printing defects when operating a sheet-fed offset printing press.

RESEARCH METHODOLOGY

A test form has been designed for printing on a multi-colour sheet-fed offset press. Special attention was given to incorporate various printing elements and a colour control strip into the test form. In addition, we will identify the commonly used paper substrates for the sheet-fed offset press and utilize paper testing equipment available in the departmental paper testing laboratory to measure various characteristics of these papers. The identified papers will then be employed for printing on a multi-color sheet-fed offset press. The final step involves identifying any printing defects that may occur during the printing process. To assess and identify these defects, the printed sheets will be analyzed using a spectrophotometer.

DATA COLLECTION AND ANALYSIS

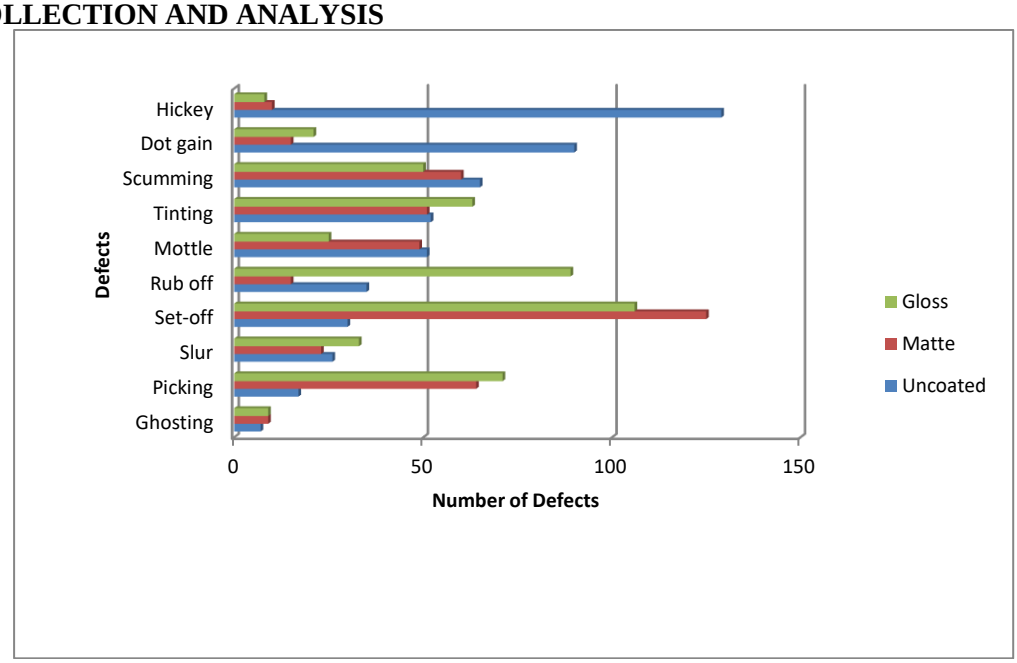

FIG.1. OVERALL AVERAGE 3 MONTHS SHEET WASTAGE ANALYSIS OF ALL KINDS OF PAPERS

	Uncoated	Matte	Gloss
Ghosting	7	9	9
Picking	17	64	71
Slur	26	23	33
Set-off	30	125	106
Rub off	35	15	89
Mottle	51	49	25
Tinting	52	51	63
Scumming	65	60	50
Dot gain	90	15	21
Hickey	129	10	08

TABLE: OVERALL AVERAGE 3 MONTHS SHEET WASTAGE ANALYSIS OF ALL KINDS OF PAPERS

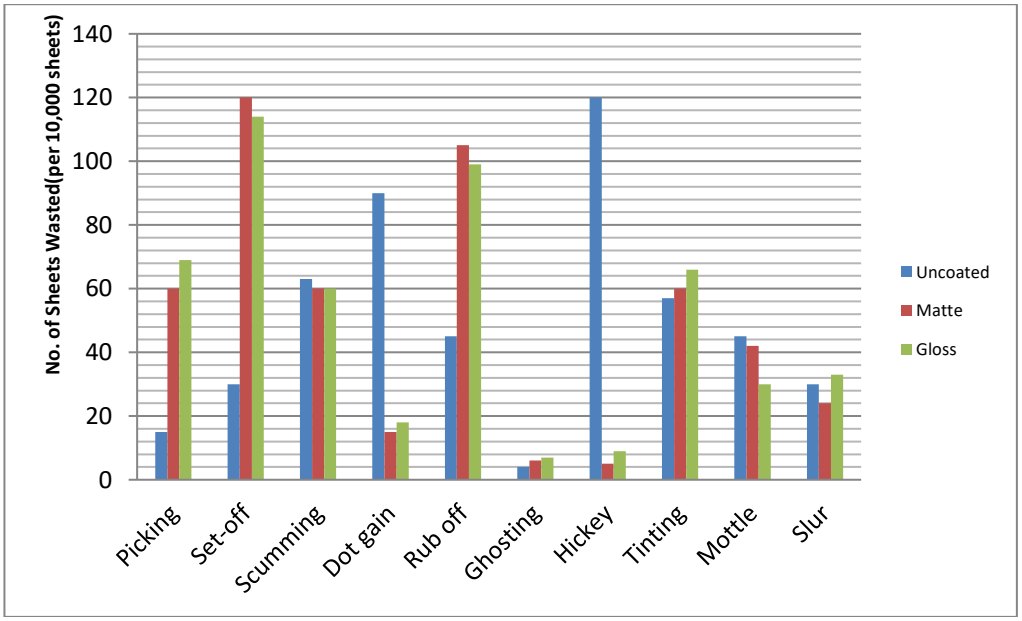

Fig.2. Comparison of No. of Sheets Wasted of between Uncoated, Gloss and Matte Coated Paper in Month of July

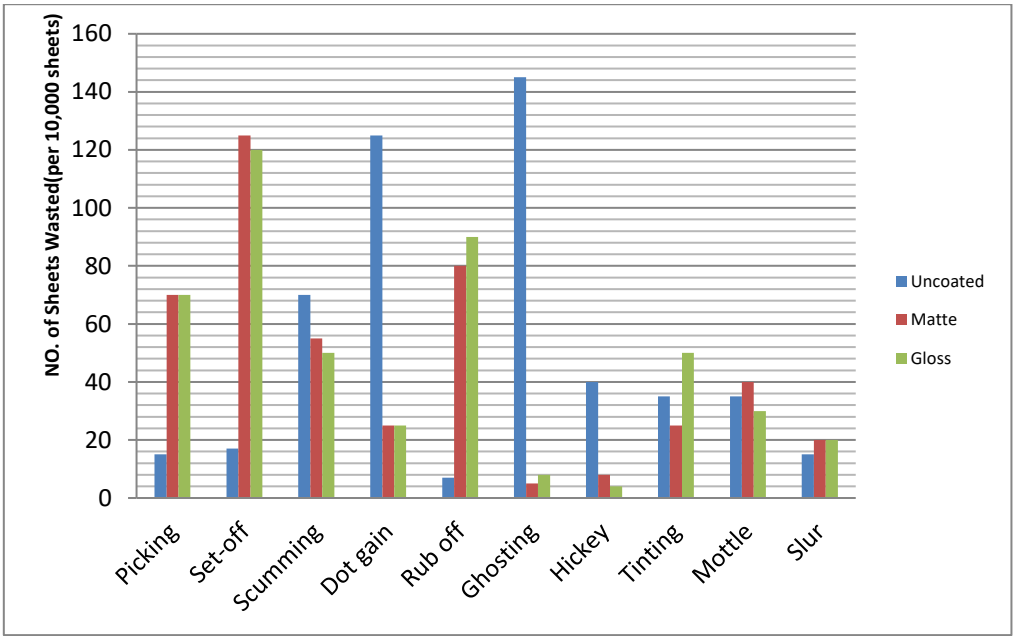

Fig.3. Comparison of No. of Sheets Wasted of Between Uncoated, Gloss and Matte Coated Paper in Month of August

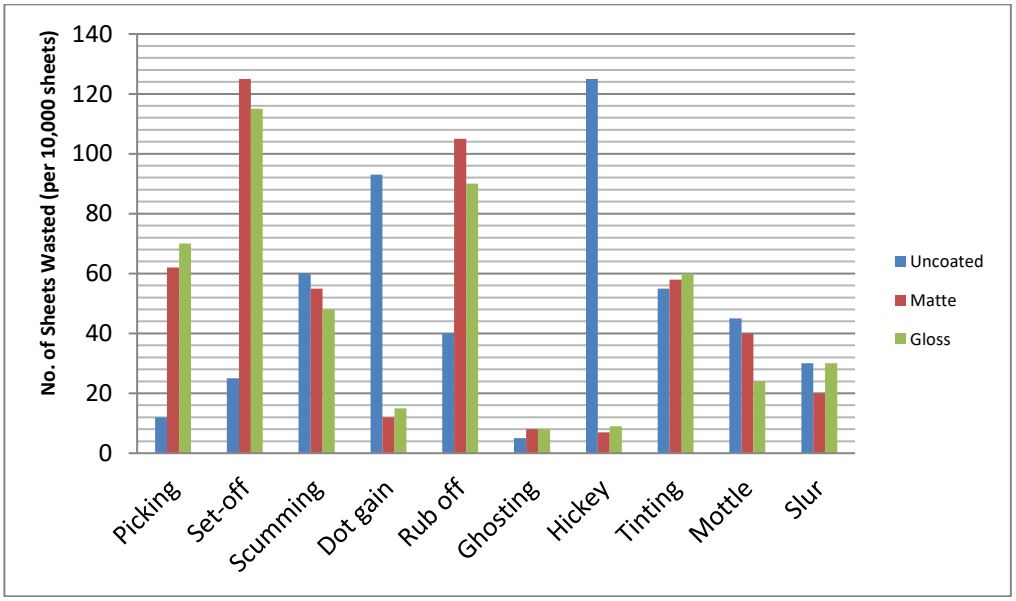

Fig.4. Comparison of No. of Sheets Wasted of Between Uncoated, Gloss and Matte Coated Paper in Month of September

RESULT AND DISCUSSION

July:

Upon examining the data for the month of July, it is evident that Hickey, Scumming, and Dot Gain are the most frequently occurring defects on uncoated paper grades, compared to matte coated and gloss coated paper stocks (see Table 1 and Figures 1-4). On uncoated paper, Setoff, Mottle, Slur, and Tinting are defects of average occurrence, while Ghosting and Picking are less common. Matte coated paper shows that Setoff and Ruboff are the most common defects, while Picking, Tinting, and Scumming are of average occurrence, and Dot Gain and Ghosting are the least frequent. For gloss coated paper, Setoff, Ruboff, and Picking are the most prevalent defects, with Mottle and Slur showing average occurrence, and Ghost, Hickey, and Dot Gain being the least common defects.

August:

Analysis of the data in August (see Table 2 and Figures 5-8) reveals that the total defect rate for this month was 4.9%. The primary defect on uncoated paper resulted from the presence of extra foreign fibers, causing Hickey defects on the final print. Conversely, the most frequent defect on coated paper varieties was Picking. The least

occurring defects across all types of paper remained consistent with those observed in April, namely Ghosting and Slur, which seem to be independent of the paper type.

September:

In September (see Table 3 and Figures 9-13), a similar trend to July and August persisted. Picking, Setoff, and Ruboff were the most frequently and significantly occurring defects on matte and gloss grade coated papers. Uncoated paper experienced Dot Gain, Hickeys, and Mottle as the most frequent defects. Ghosting and Scumming, when they occurred, resulted in the wastage of a substantial number of sheets and proved challenging to control. The graphical representations and tables further support these observations. The defects occurring on a daily basis include Scumming, Tinting, Picking, Setoff, and Dot Gain, while Ghosting and Slur are relatively rare. Defects such as Tinting, Scumming, Slur, and Ghosting do not appear to be influenced by the paper type but can still lead to significant sheet wastage if they occur.

CONCLUSION

- The average sheet wastage resulting from various defects in typical sheet-fed offset printing operations is approximately 5%, with a margin of variation of around 2%.
- Among sheet-fed offset printing organizations, Dot Gain, Hickey, and Mottle are the most frequently and significantly occurring defects when working with uncoated paper stocks.
- Picking, Set-off, and Rub-off are the primary and majorly occurring defects found when using matte and gloss grade coated paper stocks in sheet-fed offset printing.
- Tinting, Scumming, Slur, and Ghosting are defects that do not depend on the type of paper stock used for printing; they can manifest independently of the paper variety.
- Sheet-fed offset printing operations commonly face daily occurring defects such as Scumming, Tinting, Picking, Set-off, and Dot Gain, which require effective control measures.
- Ghosting and Slur, although less frequently occurring, can lead to substantial wastage and downtime if left uncontrolled.

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