

Machine Downtime and Printing Defect Analysis in Sheet-Fed Offset Printing Systems: A Case Study on Production Reliability and Quality Control in Pharmaceutical Packaging Printing

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ABSTRACT

Offset printing process is the prominent printing process to print on cellulosic substrate for long run printing jobs. But one of the major drawbacks of offset is the longer make-ready time and machine downtime during print production. Also a wide range of printing defects occur in sheet-fed printing organizations causing a lot of print wastage. The present case study was carried out at Edelmann India Pvt. Ltd., Baddi, which is one of the most advanced printing organizations in North India. The case study was carried out in 9 months in the press section of the industry aims to find out various defects occurring in modern sheet-fed offset printing presses along with the degree of downtime the defects are responsible for.

Keywords: *Sheet-fed offset, Machine downtime, Printing Defects, Print wastage.*

I. INTRODUCTION

Offset is based on the principle that greasy ink and water don't mix with each other. Offset has become widely used process to print on paper for long run length jobs. But defects may arise during the print production causing machine stoppage. This time while the machine becomes idle is called the machine downtime. The machine downtime subsequently adds to the production cost and sometimes it causes so much delay that production may become wastage (as in newspaper organizations).

II. OBJECTIVES OF STUDY

Despite the use of modern technology in the printing industries, it still faces the various problems may be due to printing machine, ink as well as due to the paper substrate etc. which causes the reason of downtime during production hours. Unwanted stoppage during production is known as downtime, it affects the productivity as well as profitability of the production plants. The key objective of this research case study is to analyse the total downtime due to the different defects occurring during the production hours in sheet fed offset printing process.

III. RESEARCH METHODOLOGY

The whole research work was carried out in printing department of Edelmann Packaging India Private Limited Baddi (H.P.). The whole research is based on the calculation of the total downtime occurring during the printing hours with the sheet fed offset printing process from 1st March 2018 to 31st Nov. 2018 (9 months). During the printing with sheet fed offset printing process many defects arises which causes the downtime in the main production hours. The mainly defects observing during the research study: -

- Shade Variation
- Key line problem
- Set off
- Wrong Grain Board
- Board dust problem
- Scumming
- Board De-lamination
- Registration Out
- Blanket puncture
- Film Linning
- Non-varnish zone (NVZ)
- Other problems.

IV. DATA COLLECTION AND ANALYSIS

The research data i.e. observation of occurred defects during the printing with sheet fed offset printing machine was collected on day to day basis.

The primary sources of data included the observations of various defects and total downtime taken to short out these defects during the main production hours of sheet fed offset printing machine. Finally, the interpretation of collected data was made to analyse and conclude. The findings of research study are presented below:

Table 1: Problem Occurrence and downtime in Sheet-fed offset Printing

Sr. No.	Problem Occurred	Frequency of Problem Occurrence	Total Downtime to short-out occurred problem (In Minutes)
1.	Shade variation	46	1615
2.	Key Line Problem	22	455
3.	Set off	4	160
4.	Wrong Grain Board	7	130
5.	Board Dust Problem	37	1180
6.	Scumming	10	285
7.	Board De-Lamination	5	130
8.	Registration out	22	645
9.	Blanket Puncture	42	1200
10.	Film Linning Problem	32	670
11.	Non-Varnish Zone (NVZ)	7	190
12.	Others Board Problem	12	565

The figure 1, represent that shade variations blanket puncture is the most occurring problem during printing with sheet fed offset printing machine, on other hands set-off and board de lamination is very rarely occurring problems.

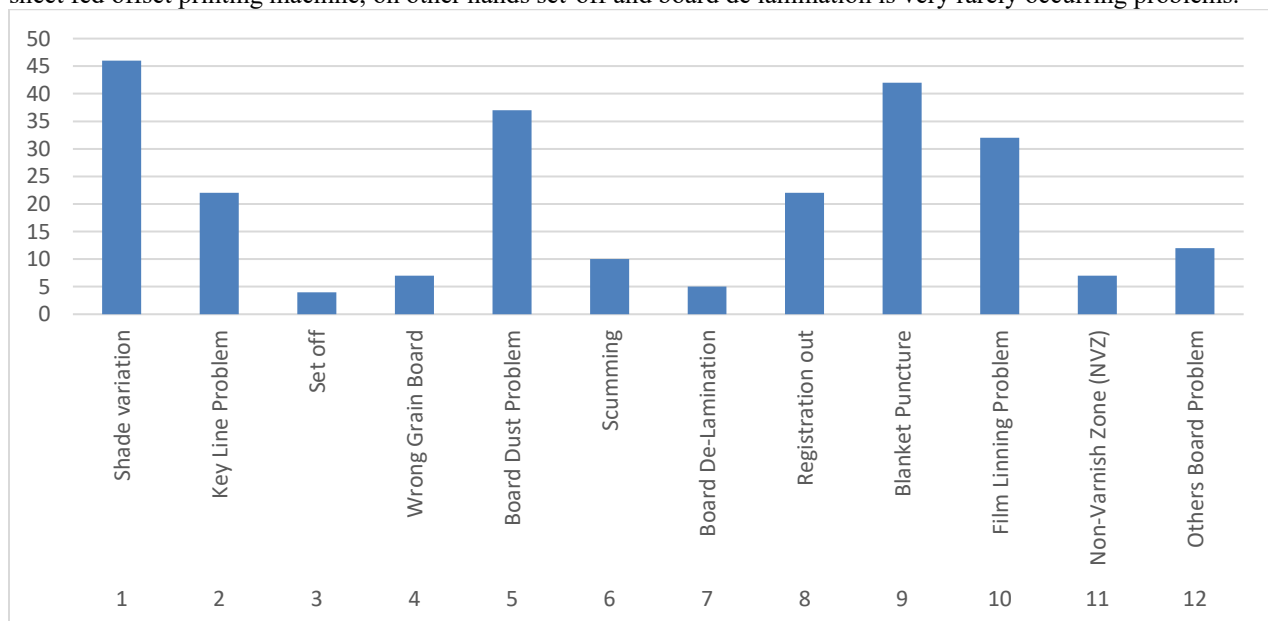


Figure 1: Frequency of Problem Occurrence in Sheet-fed offset Printing

In this Figure2, it clearly expressed that during the printing with sheet fed offset machine 19% problems occurred only due the color variations which is the most significant problems and board de lamination which is only 2% is the very rarely occurred problem.

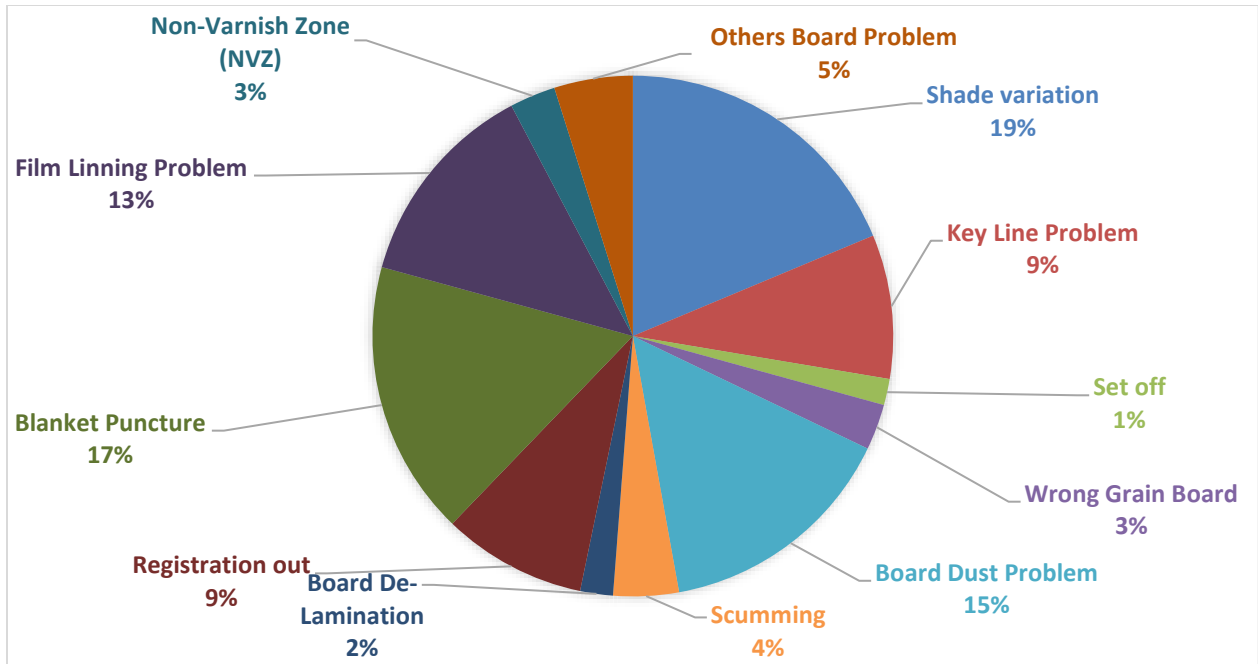


Figure 2: Defect Analysis

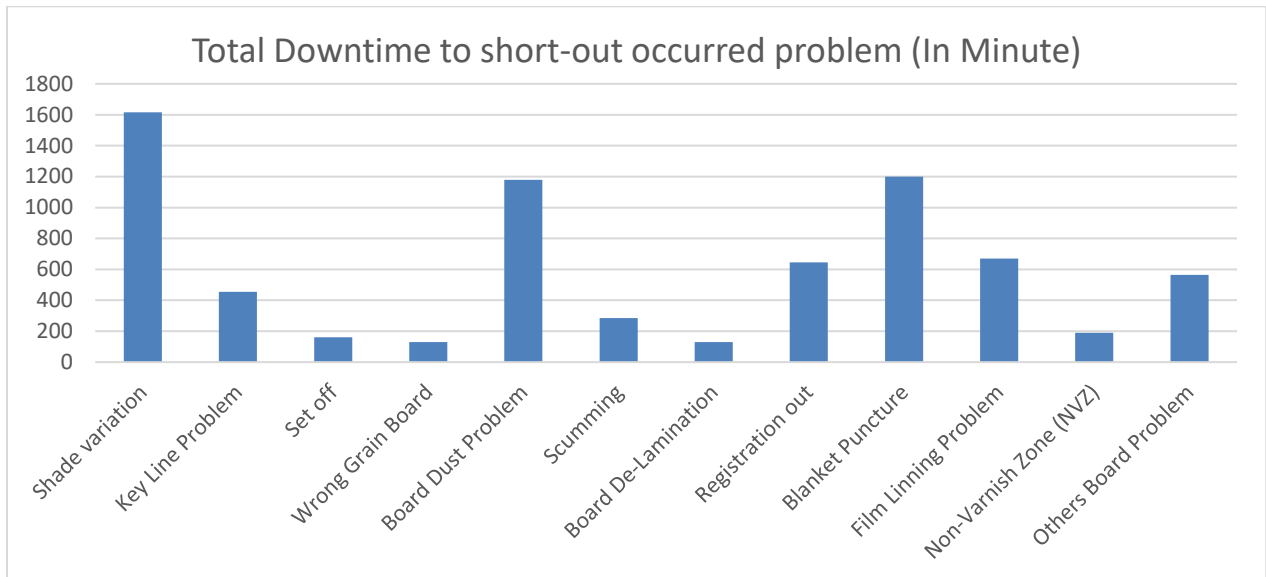


Figure 3: Downtime Analysis

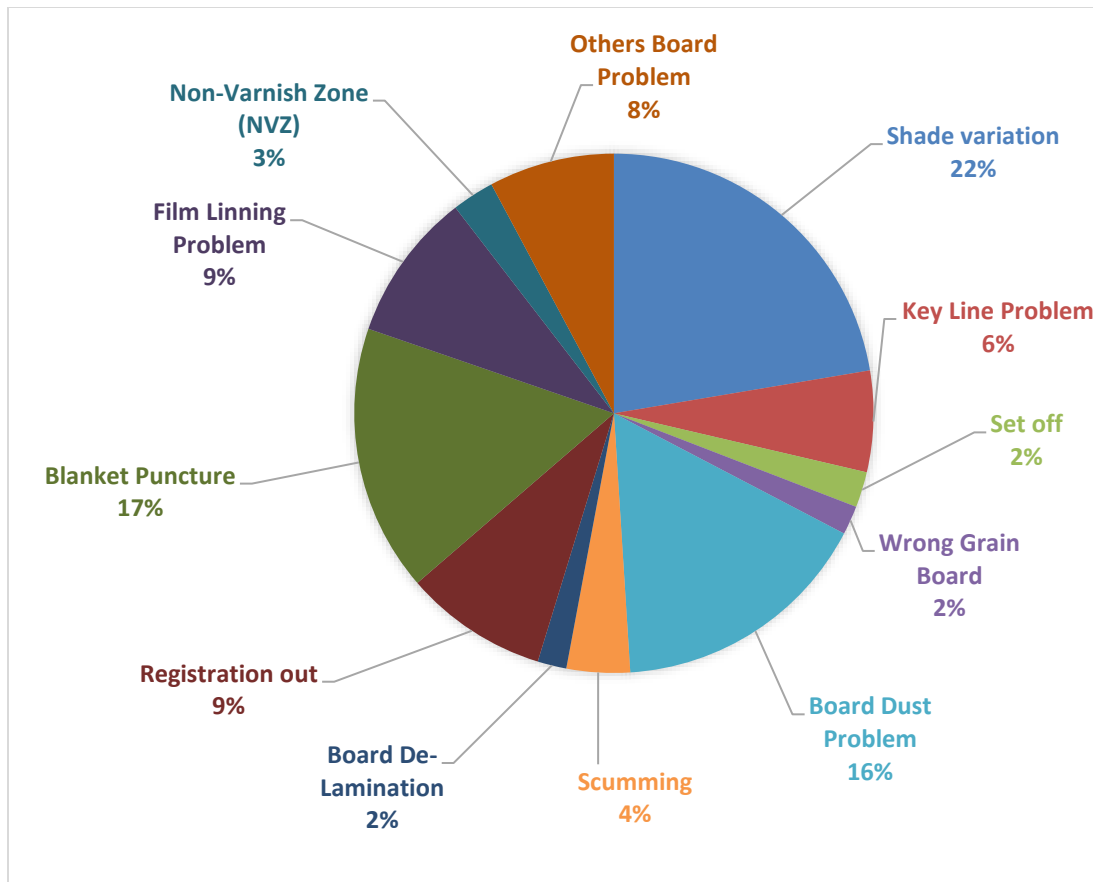


Figure 4: Downtime Analysis

It is indicated in figure 3, and figure 4 that Shade variation, blanket puncture and board dust problems required maximum time to modify which increase the downtime during production hours.

V. RESULTS AND DISCUSSION

The results of the data collected during the research are depicted in table 1, figure 1,2 and figure 2. By analysing the data during research, it was found that Shade variations and Blanket Puncture are the most frequent occurring problems on sheet fed offset printing as presented in table 1. The frequency of occurrence of Shade variations and blanket puncture was 19% and 17% respectively as presented in figure 1. On the other hand, it was found that 22% of total downtime spends to sort out the shade variations problem, and 17% spend on to rectify blanket puncture defects during printing on sheet fed offset printing process.

VI. CONCLUSION

This research paper has presented a concise overview of major printing defects and total downtime consumed to rectify these defects during printing with sheet fed offset printing machine. This paper elucidated different most frequently occurring defects to rarely occurring defects. Most of the downtime is consumed to rectify the shade variation and blanket puncture problems. Where set-off, De-lamination and Scumming are the very rarely occurring and require very less time to sort out these problems during printing with sheet fed offset machine.

REFERENCES

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