

**INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH
TECHNOLOGY****CORROSION ANALYSIS OF METALLIZED FILMS AFTER PRINTING****Mr. Dhirender^{*1}, Mr. Rajeev² & Mr. Manoj³**^{*1}Technical Officer, UFLEX Ltd., Noida, U.P.²Manager Punjab National Bank, Branch Office, GJUS&T, Hisar, Haryana³Manager, Edelmann India Pvt. Ltd., Baddi

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ABSTRACT

Print quality has always been a point of strong concern among printers and consumers. Metalized films have gain a wide spread popularity among printers because of its low cost and high usages in food packaging applications. But sometimes corrosion spoils the printed products causing huge financial loss to the printers or customers. This paper throws light on major causes of corrosion on metallized films and possible remedies for the same. The metallized films with polyester base were base coated and printed with UV inks on Heidelberg CD-102 at 8000 IPH with standard working environment. Further during carton manufacturing, the PVA glue was applied on the films. After 5 days of printing corrosion was examined and possible causes were analysed. The results indicated that excess moisture was the most vulnerable factor contributing to corrosion. Improper pH of glue was found least contributing factor to the corrosion.

KEYWORDS Metallized film, Corrosion, Folding Carton, PVA glue, Wastage, Remedial Measures.**I. INTRODUCTION**

Applications of metallized films are increasing day by day for food and carton based packaging. So it has become important to examine the reasons of spoilage and wastage on such type of substrates during and after printing. Sometimes even after achieving excellent print quality on print floor, the final product quality may suffer before or after reaching to end user. So to maintain good print quality and maintain it upto post printing applications printers should be aware about various reasons responsible for spoilage and their possible remedial measures [1],[2].

II. RESEARCH OBJECTIVES

Metalized films have come to arise to impart high print quality to suit customer requirements. But after printing, corrosion problem arises on the metallized film, which has become a point of strong concern among various printers. The objective of this research case study is:

1. To analyse various possible causes of corrosion on metallized films after printing.
2. To identify various factors causing corrosion and classify them into most frequently occurring to rarely occurring.
3. To suggest remedial measures to prevent corrosion on metallized films.

III. RESEARCH METHODOLOGY

The whole research work was carried out in Edelmann Packaging India Pvt.Ltd.. During the print production, the corrosion behaviour of metallized films was analysed after 5 hours of printing. The whole research is based on the corrosion analysis of metallized films after corrugation process. The corrosion was observed due to:

1. Excessive moisture
2. Glue pH value
3. Metal Used during metallization
4. Type of glue used

5. Storage conditions
6. Substrates used in corrugation
7. Substrate used in printing
8. Cobb value of Paper/Board
9. Working environment
10. Job Processing

IV. DATA COLLECTION AND ANALYSIS

The machine defect data was collected on day to day basis. The primary sources of data will include the observations of various corrosion defects arising on machines from above ten factors. The secondary sources of data include the information from books, magazines, journals, internet etc. The entire data was analyzed using suitable statistical tools and technique like bar graphs and charts. Finally the interpretation, finding and results and discussions were held about corrosion optimization in typical metalized film based printing industry. No hypothesis is used in the present research.

Table.1. Corrosion Analysis for Rockford whiskey 750ml carton

	Excessive moisture	Glue pH value	Metal Used during metallization	Type of glue used	Storage conditions	Substrates used in corrugation	Substrate used in printing	Cobb value of Paper/Board	Working environment	Job Processing
Day 1	0	0	0	0	0	0	0	0	0	0
After 3 Day	0.2	0	0.2	0	0	0.2	0	0.1	0	0
After 5 Day	4	0	2	0.5	0.25	0.5	0	0.25	0	0
After 10 Day	15	0	5	1	1	1	0.5	0.5	0.5	0.5
After 15 Day	50	0	22	12	4	3	2	2	2	3

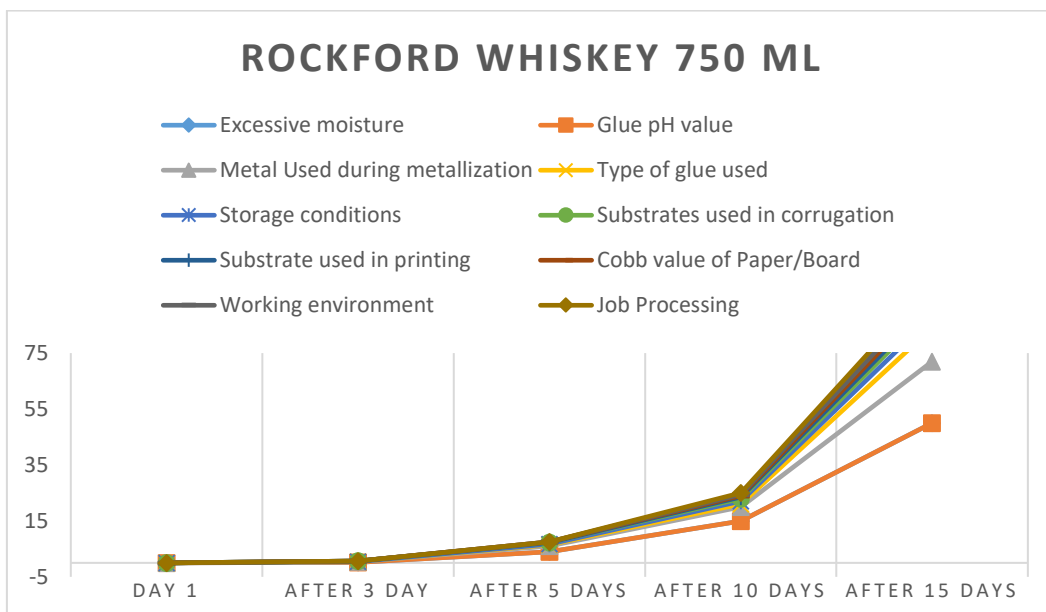


Fig.1. Corrosion Analysis for Rockford whiskey 750ml carton

Table.2. Corrosion Analysis for Rockford Classic whiskey 750ml carton

	Day 1	Day 3	Day 5	Day 10	Day 15
Excessive moisture	0	0.5	7	10	12
Glue pH value	0	0.35	1	1	1.25
Metal Used during metallization	0	0.5	2	3	4
Type of glue used	0	0.2	1	1	2
Storage conditions	0	0	1	3	3
Substrates used in corrugation	0	0.35	1	2	2.5
Substrate used in printing	0	0	0.5	2	2
Cobb value of Paper/Board	0	0.25	1	2	2
Working environment	0	0	0	1	2
Job Processing	0	0	0	1	2

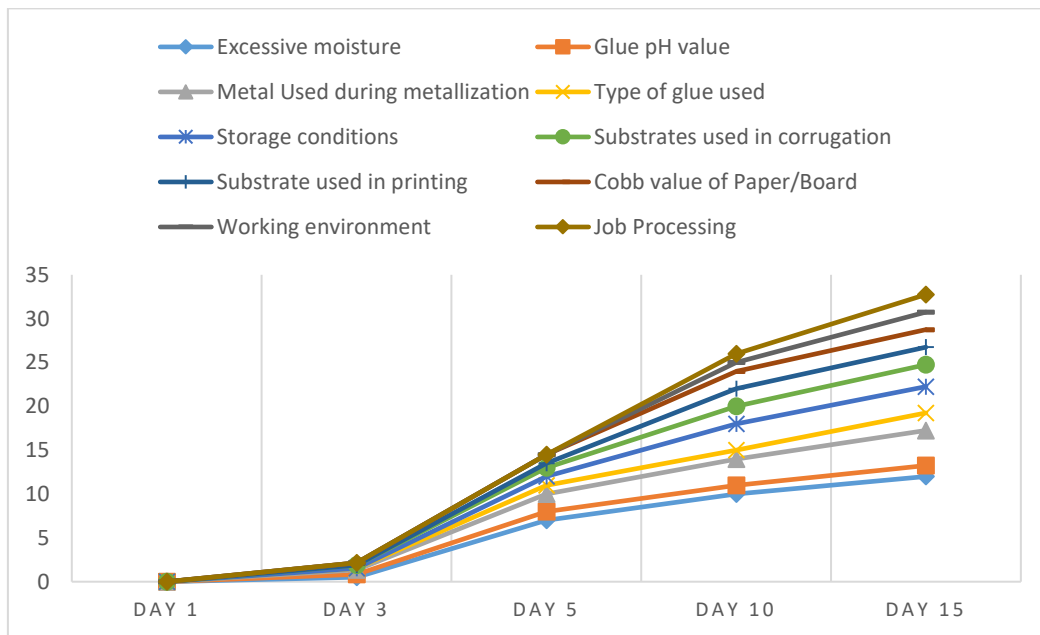


Fig.2. Corrosion Analysis for Rockford Classic Whiskey 750ml carton

Table.3. Corrosion Analysis for Rasgulla 1kg Carton

	Day 1	Day 3	Day 5	Day 10	Day 15
Excessive moisture	0	0.35	2.75	3.25	3.85
Glue pH value	0	0.25	0.35	0.39	0.39
Metal Used during metallization	0	0.35	0.45	0.38	0.38
Type of glue used	0	0	0	0	0
Storage conditions	0	0	0.5	0.53	0.85

Substrates used in corrugation	0	1	1.8	2.1	2.5
Substrate used in printing	0	0	1	2.36	2.45
Cobb value of Paper/Board	0	0.25	0.25	0.38	0.38
Working environment	0	0	2	3.5	4
Job Processing	0	0	0	0	0

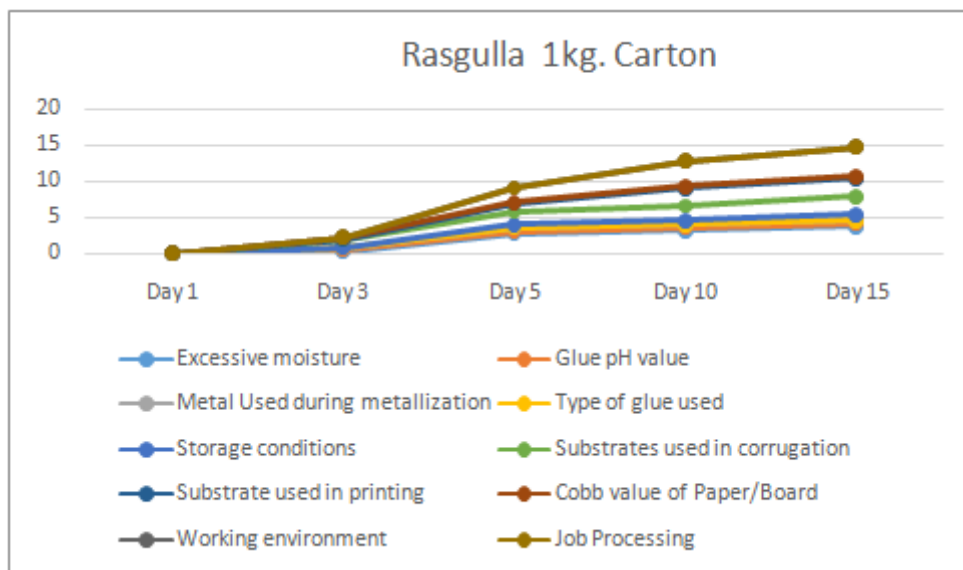


Fig.3. Corrosion Analysis for Rasgulla 1kg carton

Table.4. Corrosion Analysis for Health Ok 200ml carton

	Health OK 200ml carton				
	Day 1	Day 3	Day 5	Day 10	Day 15
Excessive moisture	0	0.2	0.2	0.3	0.35
Glue pH value	0	0	0	0.1	0.2
Metal Used during metallization	0	0	0.1	0.15	0.2
Type of glue used	0	0	0.05	0.14	0.22
Storage conditions	0	0	0	0	2
Substrates used in corrugation	0	0.35	0.5	0.65	0.65
Substrate used in printing	0	0	0	0.1	0.1
Cobb value of Paper/Board	0	0.1	0.15	0.25	0.25
Working environment	0	0	0	0.35	0.35
Job Processing	0	0	0	0.2	0.2

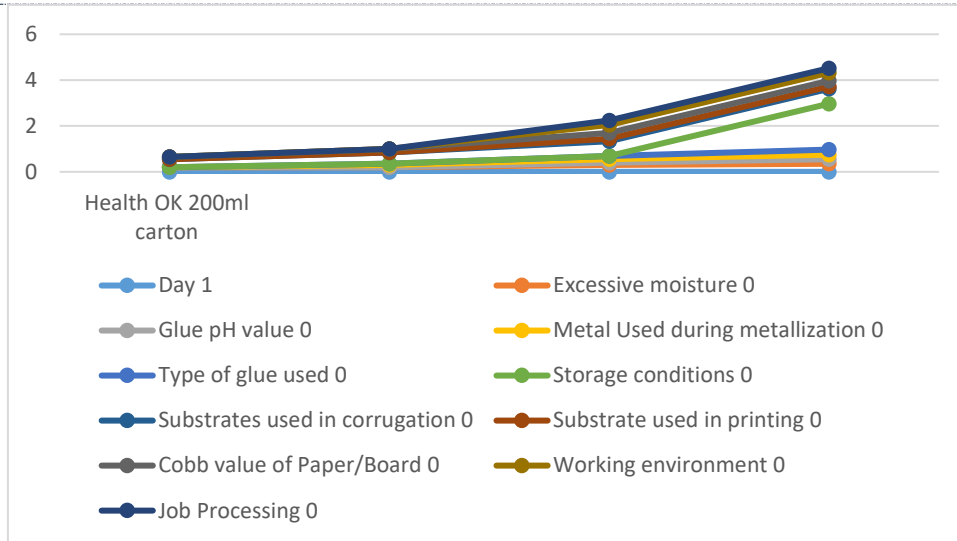


Fig.4. Corrosion Analysis for Health Ok 200ml carton

Table.5. Total Wastage % for different job

Job Name	Total Wastage %
Rockford Whiskey	100
Rockford Classic Whiskey	32.75
Rasgulla	14.8
Health Ok	4.52

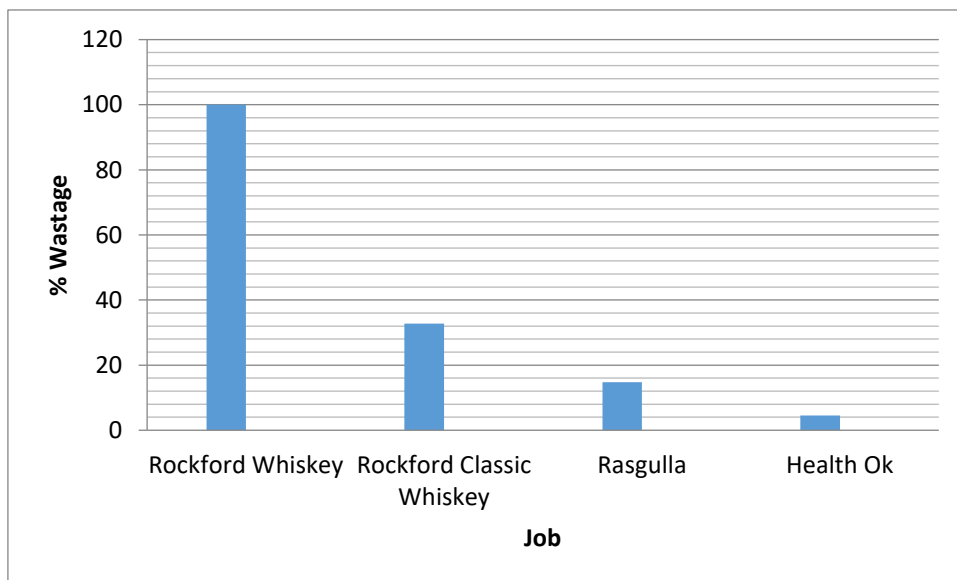


Fig.5. Total Wastage (%) for different jobs

V. RESULT AND DISCUSSIONS

1. Corrosion Analysis of metalized films on various jobs:

By analyzing the first job (Rockford Whiskey 750ml) it was found that the metal & excessive moisture are the major factors contributing to corrosion. Environment condition & storage conditions also affect corrosion but they are least contributing. Excessive water content in glue also causes corrosion. Substrate used during printing & corrugation work also can create corrosion problem (Table 1-4, Fig. 1-4).

2. Influences of time on corrosion process:



By analyzing all the jobs we found that corrosion process depends upon time. When the job moves to printing, no corrosion occurs. After few days, we found some corrosion patches onto the surfaces of the carton. So it is results that corrosion process on metallized films increases with the passage of time frame (Table 1-4, Fig. 1-4).

3. Wastages analysis of metalized films:

Wastage is caused majorly by excessive moisture & metals used in the metalized films. In the first job (Rockford Whiskey 750 ml) maximum wastage was caused by impure metal and excessive moisture content. Wastage was found 100 %. On the 2nd job (Rockford Classic Whiskey), wastage was found 32.7 %. On the jobs like Health Ok wastage was found less than 5 %. So it is resulted that wastage can be as maximum as 100 % depending upon the causes of corrosion (Table 1-5, Fig. 1-5).

4. Remedial majors to prevent corrosion:

Moisture content should not be more than 7 % to avoid corrosion. Metal purity should be ensured during metallization process to avoid corrosion. The storage and environment conditions should be optimum. The cobb value of craft paper and board must be less than 50 g/m². PVA adhesives should be preferred to starch based adhesives to avoid corrosion.

VI. CONCLUSION

- Corrosion in metallized film is majorly caused by excessive moisture content.
- Impure type of aluminium metal used in metallization contributes 2ndly to the corrosion.
- Job processing is the reason which contributes least to the corrosion in metalized films.
- Corrosion may cause job wastage even upto 100 %.
- Corrosion influence highly depends upon passage of time after final printing work. It goes on increasing with the passage of time.
- Surrounding storage and environmental conditions are also responsible for corrosion in metalized films.
- Use of pure quality metal, proper moisture content, sound environment and storage conditions, good quality adhesive can prevent/minimize the corrosion upto a significant level.

VII. REFERENCES

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