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Analysis of Various Types of Problems in Conversion Printing Flexible Substrate and Possible Trouble Shooting

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Abstract: In this paper is attempt to the analysis of common causes occur during flexible printing presses. This paper was analysis in printing organization and modern types of running machine in which conversion design printing & packaging presses still is vulnerable to a wide range of printing defects. Time has come when printers need to be existing after a long passage of time, on the other some defects are very frequently occurring. Objective of this paper is to throw light on how frequently various defects occur during conversing press run. Conversion industry in flexible packaging assembles few finished goods like polymeric films, ink, and adhesive by means of some process to generate other finished goods which is called laminate. Laminates are exclusively used as packaging material of various products. The work was carried out at a local press and various types of possible problem in online and off line cause occurs were observed for printing defects. The result indicates that various possible causes are majority arises defects independent of types of job in print organization.

Keywords: conversion, packaging, printing organization, defect, analysis, laminate and polymeric film.

I. INTRODUCTION

Conversion is best explained as assembling of new finished goods to develop another finished good. It doesn't involve manufacturing. conversion industry in flexible packaging assembling few finished goods like polymeric films, ink, adhesives by means of some process to generate another finished goods which is called laminate. Laminates are exclusively used as packaging material of various products.

A. Process Involved in Conversion

- 1) Printing
- 2) Lamination
- 3) Slitting
- 4) Pouching

Common problem in Gravure printing process and its trouble shooting

Abrasion of cylinder; cylinder erodes at a faster rate than normal due heavy friction which result low color strength and unwanted marks in the print.

Possible cause	Possible remedies
Poor chrome coating of cylinder.	Re- chrome
Poor grinding of pigment.	Ensure adequate grinding during ink manufacturing choose better quality pigment if required.
Doctor blade is not oscillating.	Ensure oscillation of doctor blade assembly.

Dry printing; ink in not transferring adequate from cylinder cell to substrate resulting undersigned pattern in the print.

Possible Cause	Possible remedies
Too high blade angle and blade pressure	Resetting of doctor blade
Dry ink in cylinder cells from start up	Proper cleaning of cylinder during make ready.
Too fast drying of ink due to high running viscosity or excessive fast drying solvent in the ink or uncontrolled blowing of air on the top of cylinder	Reduce ink viscosity to desire level by adding solvent, cylinder should not be exposed to blow of air.

Line Marks; continuous undesirable fine lines are found in print sample.

Possible causes	Possible remedies
Scratches on cylinder	Polish or replace cylinder
Too much wear and tear of doctor blade causes inefficient wiping	Change doctor blade

Scum; faint ink appears on its non image area of print.

Possible causes	Possible remedies
Porosity in the surface of the cylinder result carries of a thin layer of ink after wiping.	Polish or re- chrome the cylinder
Too much grinding of pigment	Controlled grinding is necessary
doctor blade notable wipe ink precisely	Adjust doctor blade pressure and angle if possible or change the doctor blade

Mottling; poor lay of ink on the substrate and print looks spotty, non- uniform

Possible causes	Possible remedies
Sagging of ink dot on substrate before drying due to very low viscosity of ink or slow machine speed with low viscosity ink.	Increase ink viscosity by adding fresh ink. Adjust machine speed.
Too much cell depth of cylinder dot bulky and prone to sagging.	Correct cell depth. Increase the doctor blade angle to reduce ink volume in the cell after wiping.

Ink picking; ink is some part of printing areas as ink is transfer to idle rollers.

Possible cause	Possible remedies
Inadequate drying of ink leads to its transfer on idle rollers.	Add fast drying solvent to the ink. Increase temperature and air velocity in the dryer
Transfer of ink on dirty idle roller.	Clean idle roller

Pin Holes or Dot Skipping; appearance of small unprinted holes, dots or spots on the printed area.

Possible cause	Possible remedies
Inks falls to form continuous film on the substrate due to lack of binder	Adjust binder percentage by diluting ink with true solvent
Low treatment level and roughness of substrate.	Use corona treater and ESA system. Primer coating on the substrate

Foaming; small or big size air bubbles are found on top of ink and in the print sample light colored spots or patches with dark border are observed.

Possible cause	Possible remedies
Ink turbulence is excessive in the tank due to high pump speed causes trapping of air witch form lot of bubbles on top of ink	Adjust pump speed to reduce ink agitation
Ink viscosity is too low	Adjust ink viscosity fresh ink. Add some defoamer if required.

Bleeding; undesirable downwards flow of color print areas to unprinted area observed in the print.

Possible to causes	Possible to remedies
Too low viscosity of ink causes unwanted downward flow just after printing and before reaching dryer.	Increase the viscosity of ink by adding some fresh ink.
Doctor blade setting is not proper.	Adjust doctor blade setting in term of blade angle and

	blade pressure.
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B. Common Problems in Lamination and Possible Trouble Shooting

Spot formation; undesirable spots are observed in the laminate. this problem is associated with solvent base or water base adhesive lamination.

Possible causes	Possible remedies
Inadequate wetting of coating surface with adhesive	Increase adhesive GSM to ensure proper wetting of the coating surface
Incomplete drying of adhesive	Adjust temperature of dryer and machine speed to ensure adequate drying.

Link marks; distinctly visible continuous lines are observed in the laminate.

Possible cause	Possible remedies
Sticking of dust particle under doctor blade	Filter the adhesive clean the doctor blade or change the doctor blade if required

Ink transfer to the adhesive; discoloration of adhesive is observed. Print becomes hazy after lamination. This problem is associated with solvent base water base adhesive lamination.

Possible cause	Possible remedies
Impression pressure is too high	Reduce impression pressure
Machine speed is slow	Increase machine speed. Additives like anti blocking agent or hardener to be added in controlled amount to the ink to overcome this problem.

Speckling; undesirable spots are observed spots in across the entire laminate. This problem is associated with solvent less adhesive lamination.

Possible cause	Possible remedies
Inadequate wetting of coating surface with adhesive.	Increase adhesive GSM to ensure proper wetting of the coating surface
Improper lay of adhesive	Adjust impression pressure and machine speed to achieve good printability of adhesive.

Loose bond and de- lamination; one layer of substrate gets separated from other part of the composite under influence of lower than desired speed peeling force. Nature of peeling is a very important factor in the context of root cause of this issue. Following are the possible types of peeling nature

Peeling between ink layer and printing substrate i.e. ink transfer to other of composite.

possible cause	Possible remedies
Low treatment level of substrate	Check treatment level of printing substrate before printing. treatment level of the printing substrate has to be at least 38 dyne plus
Too much penetration of adhesive into ink layer which result failure of adhesion between ink and printing substrate.	Tape test of the ink to be checked after first of the sample for every roll. Carefully choice of ink according to substrate is very crucial.
Wrong ink selection	Choice of adhesive is very important. Low molecular weight adhesive is very prone to this type of issue.

Peeling between ink layer and adhesive layer:

Possible cause	Possible remedies
Wrong ink selection	Proper laminate grade ink should be chosen.
Low gsm of adhesive which is unable to flood the crests and troughs of ink layer.	Check and ensure right gsm of the adhesive on analyzing the moon cut sample and first cut laminate sample by adjusting machine speed, adhesive dilution, blade setting and flow rate of adhesive.

Peeling through the adhesive layer

Possible cause	Possible remedies
Improper adhesive layer and dryer	Adjust dryer temperature and machine speed to ensure proper drying

Peeling between adhesive layer and second substrate

Possible causes	Possible remedies
Poor adhesion between adhesive and second substrate, low gsm adhesive which is unable to flood the crests and through of surface of the second substrate.	Check and ensure the right gsm of the adhesive on analyzing the cut sample and first cut laminate sample by adjusting machine speed, adhesive dilution, and blade and flow rate of adhesive.
Low treatment level of second substrate.	Check of the treatment level of second before lamination.

C. Common Problem in Slitting and Possible Trouble Shooting

- 1) *Creasing*: these types of problem in slitting process due to improper web tension control.
- 2) *OFF- Slitting*: These problems arise when sensor does not sense track tone line slitting process.

Telescope formation laminate roll: the telescope formation problems occur due to insufficient curing of lamination roll. This problem also observed due to low winding tension in the laminate roll.

- 3) *Preventive action*: all the above mention problem can be reduced by controlling the machine parameters particularly tension control and adjustment of sensor position.

D. Common Problem in Pouching and Possible Trouble Shooting

- 1) *Discoloration & ink transfer on sealing*; color of ink becomes grayish. Some portion of ink sticks to the sealer in case of surface printed materials. In case of laminates, de-lamination takes place where ink layer transfer to the next substrate from printing substrate.

Possible causes	Possible remedies
Poor heat resistance pigment has been used of ink making. Ink itself has poor heat resistance.	Choice of ink is very important. Ink maker should be consulted.

Tunneling; tunnel formation is observed from the sealing area.

Possible causes	Possible remedies
Inadequate lamination bond strength	Lamination bond strength should be ensured during lamination.

II. RESEARCH OBJECTIVE

To this paper in which analysis of various types of problems in conversion & shooting problem during online and off line machine, when occur common problem and possible troubleshooting. This paper of main objective required following:

- A. To find out true amount and possible causes occur problem during running of machine and possible of remedies
- B. To improves the best quality of job and reduce the time due to running machine.
- C. To study the various types of problem during conversion of printing machine and shooting

III. RESEARCH METHODOLOGY

The above work was carried out in the quality control laboratory of “Aero Plast Pvt. Ltd.” Bahadurgarh, Haryana. The primary source of data has from been to checked online quality, occur possible problem during running of printing machine. Then measure of inspection quality check and control common types of problems. Secondary source of data have include the information from books, magazine, journal, internet etc, the entire data with analysis of the problem occur during run the machine.

IV. RESULT AND CONCLUSION

By the analysis of the possible problem occur when conversion of packaging film printing station, he online running machine, we should be checked all processing and techniques of possible remedies apply when the before start to the job and also should be checked online running a job. Then the measuring quality inspection checked method, we were main conclusion to apply various tools and inspection to be controlled problem by the possible remedies.

A. Benefits

- 1) It is reduce the time quality inspection or save the time.
- 2) Overall cost to be reducing and provided best quality job and
- 3) Improve the quality technique to the required job.

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