Optimizing Quality Control in the Conventional Offset Printing Plate-Making Process

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ABSTRACT

In this age of globalization and ever growing conciseness for quality compel all industries to focus on quality for utmost satisfaction of clients. In production processes it has become absolutely essential to achieve best quality with minimum expenses. Quality control basically means identification and representation of standard quality as desired and comparison of actual quality with the standard quality. Again with this comparison of shortcomings or defects in actual quality are identified, their reasons investigated corrective steps initiated in other to achieve the desired standard quality. All these exercises need completion of data and information and representing the same in proper schedules for the purpose of satisfactory production quality. In offset printing particularly in offset surface preparation there is a need for a drawing of these schedules so that all operational persons are able to consult these schedules and help in achieving the desired quality.

Keywords: Offset Plate-making, Surface Preparation, PS Plates, Quality Control.

INRTODUCTION

Printing is carried out by different Processes, but a common factor in all the processes is use of an image surface which can also be termed as an image carrier. The second common factor is application of ink on the image carrier, and transfer of inked image from the image carrier on the paper/ substrate.

Offset printing process is distinguished from other printing process because of unique arrangement of the image and non-image areas on the same plane/printing surface. In this process,printing is done with the help of appropriate ink-water balance. The street of success of this process is its image carriers which hold image and non-image areas on the same plane.

It is generally accepted that in the process of print reproduction there is a degree of loss of quality from the original artwork. In many instances this is due to the method of reproduction itself. In case of conventional offset printing a serious decline in quality may occur if control of quality is ignored during purchase of materials and processing of them in the concerned/ any department. As we know that offset printing is a team work of different experts who maintains the quality through all stages starting from artwork to print production.

The concernedoffset printing process involves large number of operations on different machine and materials in different departments to reproduce originals. To achieve quality, all the operations should be performed well in the respective departments, and all the materials used for print reproduction must be purchased after performing number of tests and the same tests are repeated before their actual use so as to achieve the desired quality.
Only few years ago the standards of plate-making process were limited to the use of Albumen and deep-etch process of plate-making. Today with the gradual advancement in technology albumen process is rarely used and the deep-each process is already replaced by pre-sensitized plate processing system. Before the preparations of plate a number of tests should be conducted in plate- making department on plate as well as on related processing chemicals to ensure the quality of plate.

METHODOLOGY

The quality of pre- sensitized printing plate is affected by factors like geometric and physical conditions of plate. I.e. size, thickness, angle of adges, smoothness and flatness of the plate etc. Apart from this, processing chemicals also play an important role in the preparation of the appropriate plate. For the same it is necessary to test a number of factors during purchase of the materials and before its use. So, to testing parameters have been compiled for testing of chemical and plates. So, keeping all above points in mind, the related data are compiled in two tables:

A. Plate Testing Methods
B. Plate Testing Parameters

The above may improve the quality aspect in plate-making department as well as in print production.

It is suggested that a proper schedule on these lines may be prepared in every printing establishment to ensure satisfactory reproduction according to predetermined standard values and tolerance limit/acceptable range.

A. Plate Testing Methods

S. No	Parameters	Equipment used for testing	Testing Method	Frequency
GEOMETRIC				
1.	**Plate right angle test**	Scale	Place the plate against the register bar. Check the square ness of the plate	Daily for every packet.
2.	**Plate Size**	Scale	Place the plate against the register bar. Check the size of the plate is perfect or not.	Daily for every packet.
3.	**Plate thickness**	Micrometre	Calibrate the micrometre Measure the thickness of the Plate at three different places. Take the average of the three readings. The average should match with the specification mentioned on the box.	Daily for every packet.
4.	**Edge of the plate**	Visual Check	Check all sides of the plate for burrs and improper cutting. Edge should be smooth and should not be sharp.	Daily for every packet.
PLATE PROCESSING				
5.	**Vacuum Test**	Timer (used in printing down frame)	Two consecutive exposures should be given on the plate. The test is carried out by exposing the graph sheets on the plate The type of graph sheet (Positive or Negative)depends On the type plate used(Positive or Negative) After the first exposure, remove the plate from the punch, and again refix it before the second exposure is given. The test detects mis-register as slight as 0.001 Inch.(0.025mm).	For every new lot received
6.	**Draw down test**	Timer (used in Printing down frame)	Expose the graph sheet on the plate. Compare the thickness of the line on the plate with the thickness of the lines on the (Positive/Negative)film Measure the undercut of the image.	For every new lot received
7.	**UGRA test**	Timer (used in printing down frame)	Once the exposure is standardized, expose the UGRA strip on the plate. Develop the plate and check for the clear steps. Check for the solid steps and the number of visible steps. Check the plate resolution with the eye glass. Check the minimum dot percentage the plate	For every new lot received

			withhold.	
			Check the maximum dot percentage the plate withhold.	
			Check the 50% dot percentage the plate withhold.	
PROCESSING CHEMICALS				
8.	**Developer pH**	pH meter	Calibrate the pH meter with the constant pH liquid	For every new lot received
			Measure the pH of the developer	
9.	**Gum pH**	pH meter	Calibrate the pH meter wit the constant pH liquid.	For every new lot received
			Measure the pH of the Gum	
10.	**Gum Conductivity**	Conductivity meter	Calibrate the conductivity meter	For every new lot received
			Measure the conductivity of the Gum solution	
PROCESSING PARAMETERS (CHEMICAL RATIO)				
11.	**Developerdilution ratio**	As per specification	Follow the Manufacturer's specification to get the consistent result.	Always follow the specification
12.	**Gum dilution ratio**	As per specification	Follow the Manufacturer's specification to get the consistent result.	Always follow the specification

B.Plate Testing Parameter

S. No	Parameters	Unit	Equipment used for testing	Standard values	Tolerance limit/ Acceptable Range
GEOMETRIC					
1.	**Plate right angle test**	Nil	T-scale		
2.	**Plate Thickness**	mm	Micro-meter	As per Machine Manufacturer	±0.02 mm
3.	**Plate Size**	mm x mm	Scale	As per Machine size	±0.05 mm
4.	**Edge of the Plate**	Nil	Visual Check		
PLATE PROCESSING					
5.	**Draw down test**	Nil	Visual Check by eye glass	Max. 2% undercut	±0.05%
6.	**Vacuum test**	Nil	Visual Check on Printing Down frame		
7.	**Exposure time test**	Second	Timer (used in down frame)	As per job	±10
8.	**UGRA Test Report**				
i)	**Minimum dot percentage**	Nil	Reflection Densitometer	2%	±1%
ii)	**Minimum dot percentage**	Nil	Reflection Densitometer	98%	±1%
iii)	**50% Dot**	Nil	Reflection Densitometer	50%	±2%
iv)	**Resolution**	Micron	Eye Glass/ Densitometer		

PROCESSING CHEMICALS					
9.	**Developer pH**	Nil	pH METER		11-13
10.	**Gum pH**	Nil	pH meter		3-5
11.	**Gum Conductivity**	Micro-semense	Conductivity meter		
PROCESSING PARAMETERS(CHEMICAL RATIO)					
12.	**Dilution Ratio (Developer)**	Nil	Measuring Jar		As per specification
13.	**Dilution Ratio (Gum)**	Nil	Measuring Jar		As per specification

CONCLUSION

Ensuring quality in plate-making is not an easy task, it is sum total of all activities and each and every step, starting from receiving of plates, materials, consumables and accurately processing them under their acceptable tolerance limit. In this paper authors try to accommodate all steps and operations to get conventional offset plates prepared each and every time with same standards. Steps mentioned here, if followed for conventional plate-making, we can get certification also. These should be practiced as standard process in any conventional Offset plate-making department. There are two sets of data available for one for Plate testing method which is applicable on conventional plates while another is plate testing parameters which is applicable on plate processing chemicals. Collectively if followed under their acceptable tolerance limit conventional plate-making may also be standardised for quality production.

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REFERENCES

[1] **Handbook of Print Media, Technologies and Production Methods,** Helmut Kipphan, ISBN 3-540-67326-1, Springer – Verlag Baelin Heidelberg, New York.
[2] **Offset Lithographic Technology, b**y Kenneth F. Hird Goodheart - Willcox Co., 2000
[3] **Printing Processes** by B.D. Mehendiratta
[4] **Graphic Technology: Process control for production of half-tone color separations, proof and production prints:** ISO 12647-7:2007.
[5] **Printing Technology** by J. Michael Adams, David D. Faux, Lloyd J. Rieber
[6] **Advances In Printing And Media Technology: Vol. - XXXIII 2007, Vol. 33, 329-339** by: Fahlcrantz, Carl-Magnus, Kristoffer & Johansson
[7] **Lithographic Technology in transition** by Ervin A. Dennis, O. Odesina, DG Wilson Delmar Publishers, 1996
[8] **Letterpress Printing Process Part – I** by CS Mishra
[9] **Letterpress Printing Process Part – II** by CS Mishra
[10] **Art and Production** by N N Sarkar.