

Computer Graphic and Image Processing Techniques used in Printing & Packaging Domains

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ABSTRACT

Printing is an art, science & technology of reproduction of 'n' number of replicas of an original/literature/catalogue etc. with the help of a suitable printing process on the desired substrate and surface. It is declared as the "Greatest Invention of Millennium" by Time magazine, USA. And the spectrum of Time magazine is very well known. It is the largest industry of India after auto-parts. We are basically a servicing industry being overlapped by various perspectives of Engineering and Sciences like Computers, Electronics, Manufacturing, Chemical, Electrical, Optical and, of course by Management aspects. By an large, any Printing and Packaging concern is divided into three main sections – Pre-press, In-press and Post-press. In other words, In-press and Post-press are meant for Hardcore Printing and Binding & Finishing works respectively. Pre-press section is there to take care of all tasks required to prepare an Image-carrier. The work in any typical Pre-press section starts with the preparation of copy that is required to be reproduced. Nonetheless, computers & their applications are an indispensable part of our Pre-press jobs. Generally, Desk-Top Publishing software like Quark X-press, Illustrator, Corel-Draw, Fox-Pro, Prinect (Heidelberg), Photoshop, Adobe In-design, Adobe PageMaker, MS-Office etc. are used in Pre-press works. The Console/Control mechanism present in Printing machines (In-press section) and Bindery equipments (Post-press section) are also using various Computer technologies.

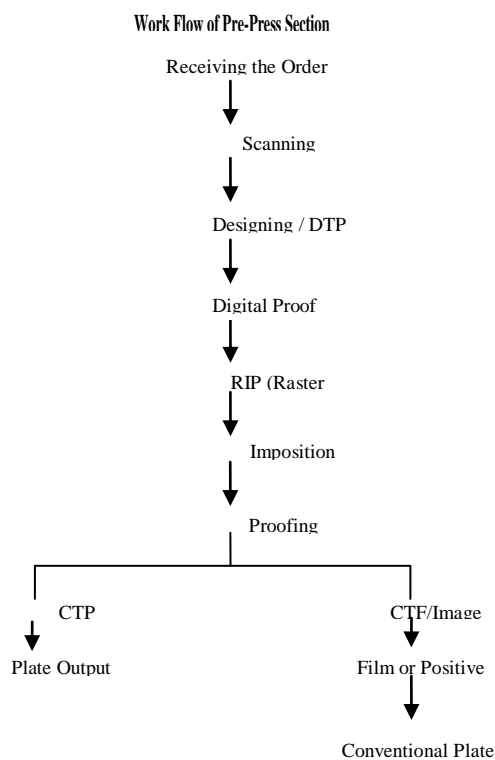
Keywords

Printing, Packaging, Pre-press, In-press, Post-press, Image-carrier.

1. INTRODUCTION

Pre-press section of a Printing & Packaging industry is the part where we prepare image-carrier. Workflow means how the work is being proceeding in a particular department. Workflow at its simplest is the movement of documents and/or tasks through a work process. More specifically, workflow is the operational aspect of a work procedure: how tasks are structured, who performs them, what their relative order is, how they are synchronized, how information flows to support the tasks and how tasks are being tracked. Work flow relationships are where work is done by different departments in a fixed sequence. That means that one department needs to finish its job before the work can be continued by another department. The development and maintenance of these work flow relationships is very important for managers because they are dependant on the preceding areas for his of her own work and is responsible to the managers and workers in the further stages of the chain.

2. PREPRESS PROCESSES



Prepress is the term used in the printing and publishing industries for processes and procedures that occur between the procurement of a written manuscript and original artwork, and the manufacture of a printing plate, image carrier, or (traditionally) forme, ready for mounting on a printing press.

The following items have each been considered part of prepress at one time or another: typesetting, copyediting, markup, proofreading, page layout, screening (of continuous-tone images such as photographs), retouching, page assembly (stripping), imposition (combination of many pages into a single signature form), trapping (also referred to as spreading and choking), separation (specifying images or text to be put on plates applying individual printing mediums [inks, varnishes, etc.] to a common print) and plate making (photomechanical exposure and processing of light-sensitive emulsion on a printing plate). However, in most modern

environments the tasks relating to content generation and refinement are carried out separately from other prepress tasks, and are commonly characterized as being part of a different process (i.e. graphic design). Some companies combine the role of graphic design and prepress production in a role or job title known as desktop publisher or DTP associate. The set of procedures used in any particular prepress environment is known as a workflow. Workflows vary, depending on the printing process (e.g., letterpress, offset, digital printing, screen printing), on the final product (books, newspapers, product packaging), and on the implementation of specific prepress technologies. For example, it is not uncommon to use a computer and imagesetter to generate film which is then stripped and used to expose the plate in a vacuum frame; this workflow is hybrid because separation and halftoning are carried out via digital processes while the exposure of the plate is carried out via an analog one.

2.1 Steps Involved In Prepress

Workflow in a prepress dept. refers to the steps being performed to finish a particular job.

- Scanning
- Page make up
- Digital proofing
- RIP (Raster Image Processing)
- Imposition
- Proofing
- Output

2.1.1 Scanning

- Scanning is transferring data (text & graphics) directly into the computer.
- Scanner is a device which measures the original and stores the information in computer memory and then manipulates the digital data into new information to create film separations.

Types of scanner

- Drum scanner
- External drum scanner
- Internal drum scanner
- Flatbed scanner

2.1.2 Page make up

- Page makeup involves the correct positioning and arrangement of print related elements.
- A wide range of DTP software's are available in order to perform the page make up.
- Various software's used for page make up are :
- PageMaker
- Photoshop
- Corel draw

2.1.3 Digital proofing

Digital proofs are taken at various stages for checking and evaluating the print as closely as possible to the finished printed result.

The different type of digital colour proofs are :

- Dye sublimation
- Laser printer
- Thermal wax prints
- Inkjet printer

2.1.4 Raster Image Processing

- Raster Image Processor operates by transforming the instructions from the DTP software's, which are stored in a Postscript language, into a bitmap form which can be utilized by the output device.
- There are two types of RIP – a hardware, which exists as a separate piece of physical hardware between the computer driven front-end unit and output unit i.e. imagesetter ; and alternatively there is a software, which resides in the computer front end

A RIP has to perform three functions

- Interpret the page description language from application program.
- Create a list of all objects on a page, 'display list'.
- Create a page bitmap for the output device, i.e. to draw the images on a page.

2.1.5 Imposition

- Imposition is the arrangement and assembly of printed images into a predetermined format, so that each printed page will appear in correct sequence and position.

Type of imposition:

- Work and turn
- Work and tumble

2.1.6 Proofing

- The process of testing final stripped images from flat on photosensitive material to check image position and quality.
- Proofing is the term used to describe the making of a copy of the proposed printed images to check content and/or reproduction quality before the job is printed.

Various types of proofs:

- **Press proofs** –They are made using the same type of ink and paper that are to be used on the final job.
- **Photomechanical proofs** – Photomechanical proofs use a light sensitive emulsion coated on inexpensive carrier, such as paper or plastic, which

is then exposed through the flat in the same way the plates will be exposed.

- **Brownlines** are formed on paper coated with a silver salt compound similar in structure to that used on photographic films. Brownlines forms an image that becomes more intense the longer the exposure to the development chemicals. The proof is developed in water, fixed in hypo, washed in water to remove the fixer, finally dried in air.
- **Diazo papers** produce a positive image when exposed to transparent film positives. The exposed emulsion is developed when placed in contact with a special liquid or gas.
- **Instant Image proofs** papers produce dry image proofs without the aid of processing equipments and chemicals.
- **Transparent color proofs** – These proofs are generally formed from separate sheets of clear-based plastic (each carrying one color image) that are positioned over each other so that total effect approximates the printed job.
- **Opaque color proofs** – These type of proof are prepared by adhering, exposing and developing each successive color emulsion on a special solid-based sheet.

2.1.7 Output

- Outputting can be in the form of Computer-to-film or Computer-to-plate, whatever method is used, electronic software will allow the imposed page images or multiple images to be produced on imagesetters or plate.
- Output can be taken on either film using imagesetters or on the plate directly using Computer-to-plate (CTP).

Imagesetter

- Imagesetters generate and expose the dots onto a photosensitive material such as- film, bromide paper, polyester etc.
- Imagesetters are driven from application programs which can output their information in a page description language called PostScript, which is a device independent programming language.

There are two main types of imagesetters

- **Capstan imagesetters** use a flatbed system, utilizing a drive mechanism which moves the photosensitive material, such as film, up to and past the imaging head in the form of a platen.
- They are capable of producing four color separations for printing with resolutions to 200+ line screen.
- **Drum imagesetters** come in two main types- internal and external drum. With drum type imagesetters, the material to be exposed is held or

attached internally or externally around a drum or cylinder.

- With internal type, the light source/imaging head moves along the inside of the rotating drum, imaging as it traverses.
- With external type, the drum not only spins but also traverses while the imaging head remains stationary.
- One advantage of external drum is that the laser light path to the film is very short compared to the internal drum, helping to achieve very accurate image.



Drum Imagesetters (DOLEV & LOTEM 400/800 Imagesetter Printing Machine)

Computer-to-plate

- Computer to plate is an advanced technology of producing a printing plate without the intermediate use of negative or positive films.
- It greatly reduces mechanical aspects such as registration problem and dot gain problem.
- This technology allows for extremely accurate dot placement and high quality plate.



Computer-to-Plate (CtP) manufactured by Heidelberg, German



Sophisticated version of Computer-to-Plate (CtP)

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4. AUTHOR'S PROFILE

About the Corresponding Author : Born on 15th August, 1982; Er. Arohit Goyat had started his career in 2003. He had a number of publications in International & National conferences. He has done M. Tech. (Print & Graphic Communication) and MBA (OB & HRD). He has also written a Book-cum-Lab manual entitled "Fundamentals of Computer". He has given International Consultancy to PANPAC LLC, USA. He has also attended more than forty International & National conferences. He has done a Project with Dainik Bhaskar, Hisar. He has also attended Orientation and Refresher courses & secured 'A' Grades. Presently, he is posted at Deptt. of Printing Technology, GJUS&T, Hisar (Haryana) in the capacity of Assistant Professor. He was also associated with World Bank Project named Technical Education Quality Improvement Program-I.