Dr. Babasaheb Ambedkar Open University

Block

1

PRINTING GRAPHICS

ROLE OF SELF INSTRUCTIONAL MATERIAL IN DISTANCE LEARNING

The need to plan effective instruction is imperative for a successful distance teaching repertoire. This is due to the fact that the instructional designer, the tutor, the author (s) and the student are often separated by distance and may never meet in person. This is an increasingly common scenario in distance education instruction. As much as possible, teaching by distance should stimulate the student's intellectual involvement and contain all the necessary learning instructional activities that are capable of guiding the student through the course objectives. Therefore, the course / self-instructional material are completely equipped with everything that the syllabus prescribes.

To ensure effective instruction, a number of instructional design ideas are used and these help students to acquire knowledge, intellectual skills, motor skills and necessary attitudinal changes. In this respect, students' assessment and course evaluation are incorporated in the text.

The nature of instructional activities used in distance education self- instructional materials depends on the domain of learning that they reinforce in the text, that is, the cognitive, psychomotor and affective. These are further interpreted in the acquisition of knowledge, intellectual skills and motor skills. Students may be encouraged to gain, apply and communicate (orally or in writing) the knowledge acquired. Intellectual- skills objectives may be met by designing instructions that make use of students' prior knowledge and experiences in the discourse as the foundation on which newly acquired knowledge is built.

The provision of exercises in the form of assignments, projects and tutorial feedback is necessary. Instructional activities that teach motor skills need to be graphically demonstrated and the correct practices provided during tutorials. Instructional activities for inculcating change in attitude and behavior should create interest and demonstrate need and benefits gained by adopting the required change. Information on the adoption and procedures for practice of new attitudes may then be introduced.

Teaching and learning at a distance eliminates interactive communication cues, such as pauses, intonation and gestures, associated with the face-to-face method of teaching. This is particularly so with the exclusive use of print media. Instructional activities built into the instructional repertoire provide this missing interaction between the student and the teacher. Therefore, the use of instructional activities to affect better distance teaching is not optional, but mandatory.

Our team of successful writers and authors has tried to reduce this.

Divide and to bring this Self Instructional Material as the best teaching and communication tool. Instructional activities are varied in order to assess the different facets of the domains of learning.

Distance education teaching repertoire involves extensive use of self- instructional materials, be they print or otherwise. These materials are designed to achieve certain pre-determined learning outcomes, namely goals and objectives that are contained in an instructional plan. Since the teaching process is affected over a distance, there is need to ensure that students actively participate in their learning by performing specific tasks that help them to understand the relevant concepts. Therefore, a set of exercises is built into the teaching repertoire in order to link what students and tutors do in the framework of the course outline. These could be in the form of students' assignments, a research project or a science practical exercise. Examples of instructional activities in distance education are too numerous to list. Instructional activities, when used in this context, help to motivate students, guide and measure students' performance (continuous assessment)

PREFACE

We have put in lots of hard work to make this book as user-friendly as possible, but we have not sacrificed quality. Experts were involved in preparing the materials. However, concepts are explained in easy language for you. We have included many tables and examples for easy understanding.

We sincerely hope this book will help you in every way you expect.

All the best for your studies from our team!

Image Editing and Processing

Block 1: PRINTING GRAPHICS

Unit 1   INTRODUCTION TO PRINTING AND RESOLUTION

Learning Objectives:

- Here you will learn what is quality printing and whatc are should be taken for good quality printing
- What is resolution and Howre solutionworks
- What is printing process

UNIT2   RESOLUTION FOR GRAPHICS

Learning Objectives:

- Here you will learn the concept of optimaloutputre solution for images
- What does image resolution mean?
- Points to remember while printing.

UNIT3   RESOLUTION FOR PRINT MEDIA

Learning Objectives:

- Here you will learn the conceptofpixelperinchanddotsperinch
- Resolution For Images maximum ppi

Block 2: FILE FORMATS, SCANNING AND RESOLUTIONS

Unit 1   FILEFORMATS

Learning Objectives:

- Here you will learn the Preface Of perfect file format susedin graphics.
- Major types of file formats widely used for quality printing

UNIT 2 DETERMINING THE RESOLUTION FORIMAGES

Learning Objectives:

- Here you will learn the Preface Of monochromeandcombination tonesin resolutionwitheffectsontexturesandpatterns.

UNIT3   SCANNER RESOLUTION, DIGITAL PHOTOGRAPHY, STOCK PHOTOGRAPHY COMPANIES

Learning Objectives:

- Hereyouwilllearntheresolutionforscanner.
- Usageofdigitalphotographyintoday'smarket

Block 3: PRINTING PROCESS AND PREPRESS LAUOUT

Unit 1   PRINTINGPROCESS

Learning Objectives:

· Here you will learn the Preface Of Printing process and various types of printingmethodsasperindustrystandards.

UNIT 2 LAYOUTPREPRESS

Learning Objectives:

· Here you will learn the process of printing press industry where by it shows how people are involve in publishingindustry

Block 4 :CONCEPT OF PRINTING PROCESS

Unit 1   PRINTING

Learning Objectives:

· Here you will learn all the concepts of printing, printers and modern machines.

UNIT 2 METHODS OF PRINTING

Learning Objectives:

· Here you will learn the Preface latest printing methods used in visual communicationandgraphicsprintmediaindustry.

<table>
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UNIT 1

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INTRODUCTION TO PRINTING AND RESOLUTION

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❖ **Learning Objectives:**

· Here you will learn what is quality printing and what care should be taken for good quality printing

· What is resolution and How resolution works

· What is printing process

: Structure :

● Introduction

● reface of Resolution for Quality Printing

● Importing Images

Introduction

Printing is the method of making an impression on paper (or on other surfaces) from inked type (or as the techniques developed, from plates, blocks, or cylinders). From this type, the most important aspect of printing is that it allows a large number of copies to be made from each setting of type.

During the invention of printing in Europe until 1700, most books were printed on wooden printing presses, using metal type.

Printing is widely used in all commercial areas and advertising industries, as well as it is called the technique of communication.

Preface of Resolution for Quality Printing

• Resolution is the measurement of the number squares of color information of an inch.

• The human eye cannot see the squares of color if there are three hundred or more in aninch. For clear and crisp printing, images at

their finalsizein the layout should be at 300dpi dots per inch = squares of color in an inch or400dpiiftheimagesincludetext.

- Resolution and size of an image are in inverse proportion to each other. An image 2 inches x 2 inches in size at 300dpi increased in the layout to 4 inchesx4incheshasanewresolutionof150dpi.

HIGH AND LOW RESOLUTION IMAGES

- The term resolution means how many of your image's pixels will fit paper when printed. Obviously, since your photo has a fixed number of pixels, the more of them you squeeze inside each inch of paper, the smaller the image will appear on the paper. Likewise, the fewer pixels you print per inch, the larger the image will appear on paper. The number of pixels that will be printed inch is the resolution of the image, or "image resolution". Image resolution has everything to do with printing your image. It has nothing to do with how your image appears on your computer screen, which is why images you download off the internet usually appear much larger and higher quality on your screen than they do when you print them.

- The Image Size into two main sections, Pixel Dimensions at the top and Document Size directly below it. The Pixel section tells us how many pixel sour images. The Document Size section tells us how large the image will appear on paper if we print it. If we look at the Pixel Dimensions, we can see that this photo width of 1200 pixels and a height of 800 pixels. That may sound like a lot of pixels (1200 x 800 = 960,000 pixels!), and it certainly would be if we were displaying this image on a computer screen.

In fact, at 1200x800, large to fit entirely on your screen! But just because it looks nice and big screen doesn't necessarily mean it

will print nice and big, at least not with any degree of quality.

Photo quality printing ultra-high resolution reproduction of digital art work printable materials such as paper, vinyl, film, polyester, etc.

The combination graphic design utilizing high resolution images printed at ultra-high line screen values photo quality printing process.

When designing photo quality printing, graphic designers and printers start with high resolution images of 2400 dpi or higher. Traditional full color non-photo quality printing from images of 1200 dpi or less. Photo quality printing requires images contain the most amount of color information possible. The high resolution images used in photo quality printing is saved in a CMYK file format to best utilize either the commercial printing process or inkjet printing photo quality output capabilities. CMYK dots of Cyan (blue), Magenta (red), Yellow, and Black are placed next to each other in specific patterns that trick the eye into seeing millions of colors. Photo quality inkjet printing transfers 4 or more toner colors to the substrate cycle through the printer. In photo quality commercial printing each color of ink is applied separately.

The high resolution photos (or output) at a line screen value of 1200 lines per inch. Traditional full color printing is done at a line screen ranging from 300 to 600 lpi. The resulting photo quality output is apparent to the naked eye micrometer. The output includes more dots of ink or toner within each square inch output - and - true color values and hues due to the greater amount of color information stored resolution image or artwork file.

Commercial photo quality printing web or sheet fed press that may consist of multiple units. The file to be printed is imaged directly onto a drum on the press or on to photographic printing plates. The drum or plates transfer ink to the paper. Photo quality printing on a desktop printer usually uses some type of inkjet or laser printer. The ink jet printer has ink cartridges that place the ink directly on the paper. These are self-contained units connected to a computer through cables.

When designing digital files intended commercial offset printing, it is essential that all of the photographs and images files are high resolution. If you see printed material that contains blurry or blocky images which often provides a bad presentation, it was likely caused by incorporating low resolution images. Ensuring printed job is as simple as making sure all photos and images in your digital files are all high resolution. The information below covers the specific differences between the two and how to avoid problems.

Often, you will require custom images pertaining to your own business or industry may have physical photos you would like to first scan then import into your design program. This is a perfectly acceptable method of acquiring high resolution images sure to scan your photos high resolution to begin with. All scanning software allows specify the resolution of image you would like scan. Selecting 300dpi (or higher) as your scanning resolution will provide you with an excellent quality image for printing purposes.

1.3 Importing Images

Importing Images from a Digital Camera:

Many graphic designers use images digital camera such as the example

catalog image to the right. This organization needed images specific facility digital camera was the best choice. There is really only one thing you need to ensure using a high resolution image. The only real difference between a high and low resolution image is the amount of pixels/dots(DPI) that are used to create the image. With this in mind, the high megapixel camera you have taking the picture, the higher resolution the photos will be in good qualities. Most cameras that can take photos above 3 mega pixels should be more than adequate to provide you with high resolution images. Keep in mind that you must have your camera set to the highest possible resolution when capturing your images.

Fig 1.1: Resolution in images

Fig 1.2: High and Low Resolution Images

Self-Assessment Test

Broad Questions –

1. What is resolution?

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2. Write note on high and low resolution images?

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3. What is printing ?

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4. What is an image ?

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5. How resolution affects the quality of an image?

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Summary

·   Printing is a process for reproducing text and image, with ink on paper using a printing press. It is often carried out as a large-scale industrial process, and is an essential part of publishing and transaction printing.

·   Resolution is the measurement of the number of squares of color information in an inch.

·   The human eye cannot detect the squares of color if there are 300 or more in an inch. For clear and crisp printing, images at their final size in the layout should be at 300dpi (dots per inch = squares of color in an inch) or 400dpi if the images include text.

· Resolution and size of an image are in inverse proportion to each other. An image 2 inches x 2 inches in size at 300 dpi increased in the layout to 4 inches x 4 inches has a new resolution of 150 dpi.

UNIT 2 : RESOLUTIONFORGRAPHICS

❖ **Learning Objectives:**

Here you will learn the concept of optimal output resolution for images

What does image resolution mean?

Points to remember while printing.

─ ─ ─ ─ ─ : Structure : ─ ─ ─ ─ ─

- Introduction

- Resolution for Graphics

- image resolution mean

2.1 Introduction

The display resolution of a television or display device is the number of pixels in each dimension. It can be an ambiguous term especially as the displayed resolution is controlled by all different factors in cathode ray tube (CRT) and flat panel or projection displays using fixed picture-element (pixel) arrays.

Resolution for Graphics

OPTIMAL OUTPUT RESOLUTION (dpi)

- If you are reproducing art work, then 1440 dpi always adequate. Oil paintings canvas, even those detail, still look great even at 720 dpi. One reason is that it is painted, where finer detail is harder to come by, and the other is that the image is being reproduced on canvas.

- Canvas "hides" poor resolution degree (even on photographs), this is partially weave of the fabric and also because of what we have come to expect from canvas images.

- If you want to make a poster (nota" fine art poster, "something like

are tail store poster) graphic for display court room, etc. and it won't be scrutinized closely, then 720 or even 360 dpi will do just fine.

- In the end mess around to see what suits you best.

RESOLUTION

Resolution and size image are in inverse proportion to each other. An image 2 inches x 2 inches in size at 300dpi increased in the layout to 4

- 4inchesx4incheshasanewresolutionof150dpi.

- Resolution=300dpi

- Will print well

- Zoomof300dpiimage
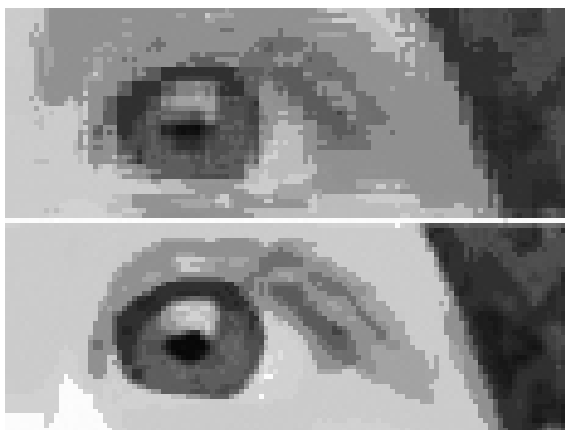
• Will print well

Fig 2.1: Colors and Resolution In Image

- Resolution=72dpi

- Will not print well

- Zoom of 72 dpi image

- This is what the whole thing will print like.-Ugly

- At last we can say that resolution is used to describe number of dots, or pixels, used to display an image.

- Higher resolution means more pixels are there for better display of image, resulting in good quality. The resolution is composed of many pixels and dots which is displayed in number such as 800 x 600. This means that there are 800 dots horizontally across the screen and 600 lines of dots vertically equally 480,000 dots that make up the image on screen.

2.3 Image Resolution

What does image resolution mean?

Resolution refers number of pixels in an image. Resolution is sometimes identified by the width and height image as well as the total number pixels in the image. For example, an image that is 2048 pixels wide and 1536 pixels high (2048X1536) contains (multiply) 3,145,728 pixels (or 3.1 Mega pixels). You could call it a 2048X1536 or a 3.1 Mega pixel image. As the mega pixels in the pickup device in your camera increase the possible maximum size image you can produce. This means that a 5 mega pixel camera is capable of capturing a larger image than a 3 megapixel camera and also storage.
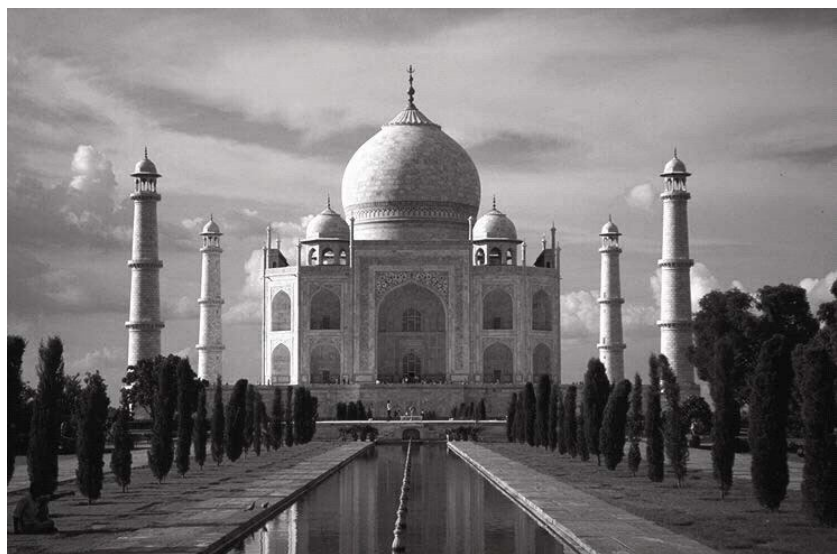
Fig 2.2: Resolution on Computer Monitor

How does image resolution play out on computer monitor?

The computer screen you are looking particular resolution as well. The larger the screen, the larger you likely have your screen resolution set. If you have a 17" monitor, likely you have it set at 800X600 pixels. If you have a 19" screen it is likely set at 1024X768. You can change the settings but these are optimum for those screen sizes.
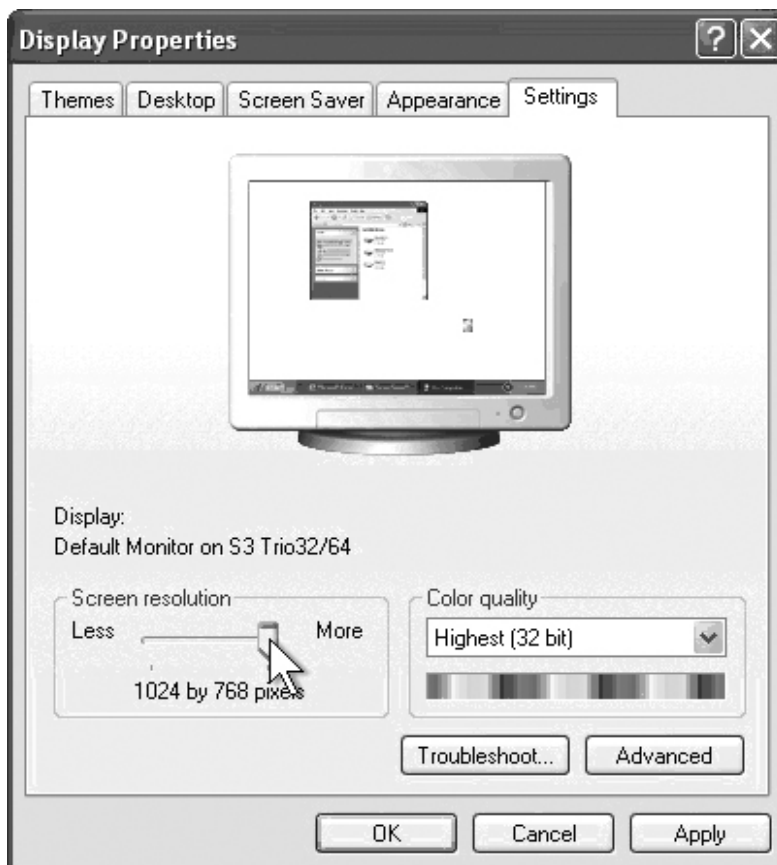
Fig 2.3: Changing Monitor Resolution

A pixel presents smallest part of the screen controlled easily. Each pixel can set to different color and brightness.

While scanning - resolution determines the spacing of the pixel samples taken master copy. If we scan a width of 2 inches at 100 dpi, we create an output image width of 200 pixels. This is basically all resolution does, and then the output device takes over.

Fig 2.4: Scanning

While printing- Resolution is just a remembered number from the original scan, and now it is used to determine printed spacing pixels paper. 200 pixels at 100 dpi will print as 2 inches width, same as the size of the scanned original. We can scale, and print it at 200 dpi, producing a 1 inch width, or as 50dpi, producing a 4 inch width.

But the printer obviously preference for some particular resolution number that's best for its dithering capability. 100 dpi may not look good if the printer wants 250 dpi. Meaning, this image may not be of sufficient size for such scaling. We can print larger have data pixels, not good. Or we can swamp the printer with a huge image, causing a flood of excessive pixels not good either.

Fig 2.5: Blur Image

Have you ever downloaded image from the internet and then printed it, only to get results that were, well, less than you expected? The image looked great computer screen, but when you printed it, it either printed at the size of a postage stamp or it printed at a decent size but looked blurry or "blocky"?

Actually, Image resolution didn't purposely set out to make when you printed your internet photo. The problem was simply that most photos on the internet have very small pixel dimensions, usually in the neighborhood of 640 pixels wide by 480 pixels high, or even smaller, and that's because images don't need to be very large at a decent size and good quality on your computer screen, and also because smaller images download much faster on websites than larger images do.

Summary

Resolution for any work depends up on its quality. The quality of print out should be always 100 percent accurate while printing. The resolution in graphics also affects file size. Blurry images are result of lower solution hence care should be taken for the pixel dimension and resolution. Print out always prefers in CMYK color as they are used for four color offset printing.

RESOLUTION FOR PRINTMEDIA

❖ **Learning Objectives:**

Here you will learn the concept of pixel per inch and dots per inch

Resolution For Images maximum ppi

: Structure :

- Introduction

- Resolution for Print Media

Introduction

As per the resolution in images in this unit we will see how resolution is useful for print media with pixel per inch and text resolution. Print media has always been evaluated by fine quality of images, text, alignment, size for high quality of printing. As in computer graphics minimum 300 dpi will always print well.

Resolution For Print Media

PPI VS. DPI

- PPI (Pixels Per Inch, usually written in lowercase ppi) and dpi (dots per inch) are two similar concepts, but are still different.

- Pixels per inch denote show many pixels are in each inch of your image at the current printing size. This is one dimensional!

- If your image has 360 ppi, for every inch of your image, it is 360 pixels wide and one pixel tall.

- Dots per inch how many droplets of ink are sprayed in a given one dimensional inch as well. Often dpi is given in that one dimensional notation (1440 dpi) although it's horizontal and vertical resolution are not always equal like they are in ppi. For example, 1440 dpi

isusually1440x 720 dpi. This means that in a square inch, it is 1440 dots wide and 720 dots tall.

In high quality photographic printing, dpi is always going to be a large number than ppi.
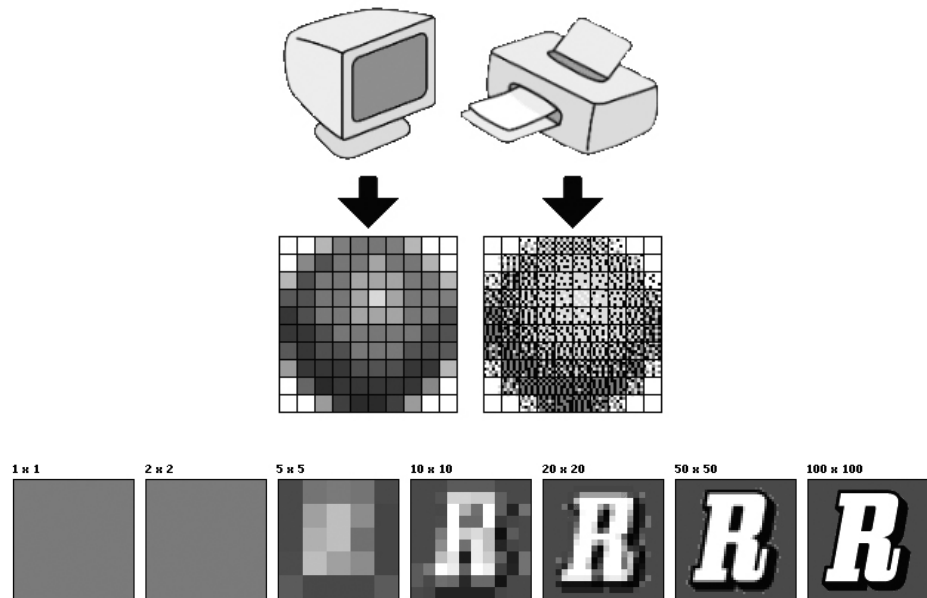
Fig 3.1: Text Resolution

Here is a table of the minimum resolutions for common print sizes. Again, these are (subjective) minimum acceptable base resolutions, higher resolutions are always better. The maximum ppi you'll ever need is 360.

- 4x5"   360ppi

- 5x7"   300ppi

- 8x10"   240ppi

- 11x14"   200ppi

- 16x20"   180ppi

- 20x24"   140ppi
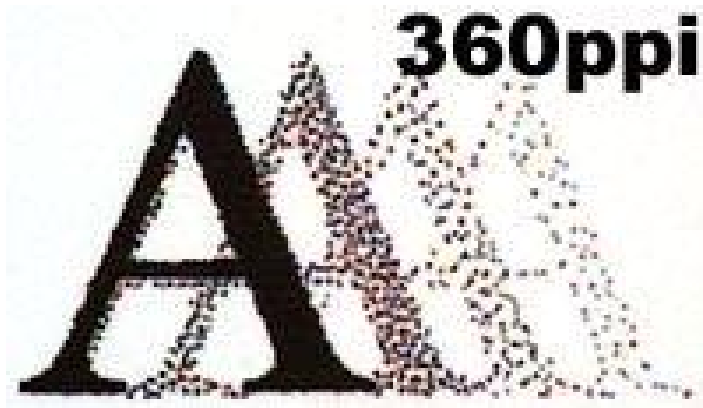
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Summary

Resolution and size of an image are in inverse proportion to each other. The basic of any graphic image is a pixel, "Picture Element", arranged in precise rows and columns. The number of rows and columns of pixels is referred to as the "resolution" of the image and is usually expressed by the number of horizontal pixels (rows) multiplied by the number of vertical pixels (columns), for example: 800*600, 1024*768, 1152*864.

Dr. Babasaheb Ambedkar Open University

Block

2

FILE FORMATS, SCANNING AND RESOLUTIONS

Acknowledgment

Every attempt has been made to trace the copyright holders of material reproduced in this book. Should an infringement have occurred, we apologize for the same and will be pleased to make necessary correction/ amendment in future edition of this book.

The content is developed by taking reference of online and print publications that are mentioned in Bibliography. The content developed represents the breadth of research excellence in this multidisciplinary academic field. Some of the information, illustrations and examples are taken "as is" and as available in the references mentioned in Bibliography for academic purpose and better understanding by learner.'

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FILES FORMATS

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· Here you will learn the Preface Of perfect file formats used in graphics.

· Major types of file formats widely used for quality printing

: Structure :

● Introduction

● Understanding various file formats

Introduction

A file format is a particular process that information is encoded for storage in a computer file. Some file formats are designed to store very particular sorts of data: the JPEG format, for example, is designed only to store static photographic images. Other file formats, however, are designed for storage of several different types of data: the GIF format supports storage of both still images and simple animations, and the QuickTime format can act as a container for many different types of multimedia. A text file is simply one that stores any text, in a format such as ASCII or UTF-8, with few if any control characters.

Understanding Various File Formats

Graphics come flavors but not all file formats are suitable for all purposes. graphics formats and those on-screen viewing or online publishing. Within each group there also formats than others for the same task.

Use GIF and JPG for online publishing. for online publishing development, at present GIF and JPG standards. Use EPS and TIFF for print publishing. formats including CGM and PCX with acceptable results; however, for high-resolution output EPS and TIFF provide the least hassles best quality. They are the standards for high-resolution printing.

In addition to the formats in the chart, below, there are proprietary graphics file formats. These are bitmap or vector formats used by specific

graphics programs. Although some desktop publishing software will recognize the more common formats such as PSD from Adobe Photoshop (bitmap) or CDR from CorelDraw (vector) it is generally best to convert these images to TIF or EPS or other common graphics file formats.

This simple chart outlines the best use for several common formats. Match the format to your job either by starting with graphics in that format or by converting other artwork to the desired format.
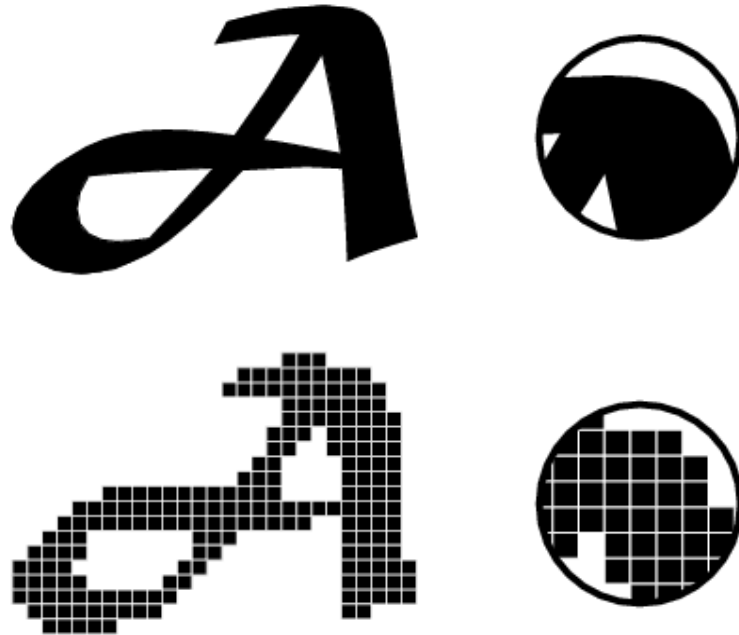
Fig 1.1: Vector Based Format

Format:	Designed for:	Top choice for:
BMP	Screen display under Windows	Windows Wallpaper
EPS	Printing to PostScript printers/ Image setters	High resolution printing of illustrations
GIF	Screen display, especially the Web	Online publishing of photographic images
JPEG	Screen display, especially the Web	Online publishing of photographic images
PICT	Screen display on Macintosh or printing to non- PostScript printer	
TIFF	Printing to PostScript printers	High resolution printing of images
WMF	Screen display under Windows or printing to non-PostScript printer	Transfer vector images via the clipboard

Summary

· Use GIF and JPG for online publishing.

· Use EPS and TIFF for print publishing.

· Although some desktop publishing software will recognize the more common formats such as PSD from Adobe Photoshop (bitmap) or CDR from CorelDraw (vector) it is generally best to convert these images to TIF or EPS or other common graphics file formats.

DETERMINING THE RESOLUTION FOR IMAGES

❖ **Learning Objectives:**

· Here you will learn the Preface Of monochrome and combination tones in resolution with effects on textures and patterns.

: Structure :

● Introduction

● Determining the Resolution for images

Introduction

The term resolution as a pixel count in digital imaging, , and international standards specify that it should not be so used, at least in the digital camera field. the convention is to describe the pixel resolution with the set, where the first number is the number of pixel columns (width) and the second is the number of pixel rows (height), for example as 640 by 480. Another popular convention resolution as the total number of pixels in the image, typically given as number of megapixels, which can be calculated by multiplying pixel columns by pixel rows and dividing by one million. Other conventions include describing pixels per length unit or pixels per area unit, such as pixels per inch or per square inch. None of these pixel resolutions are true resolutions, but they are widely referred to as such; they serve as upper bounds on image resolution.

Determining The Resolution For Images

Image Resolution

Vector graphics -independent, their resolution is determined output device. (enlarging or reducing their size) simply requires modification of their component mathematical descriptions.

Whereas vector graphics are resolution-independent, raster images are resolution-dependent—be defined. Consequently, raster image resolution is specified in pixels per inch (ppi)., image resolution commonly is referred to in dots per inch (dpi)—dpi more appropriately is attributed

to device resolution or output resolution, where the number of dots an output device is able to produce within an inch represents the resolution of the device.

PIXEL AND RESOLUTION

By dividing the number of pixels in the height and in the width or bitmap by its resolution will determine the physical size of the image—e.g., a 300ppi raster image that is 900 pixels wide and 600 pixels high is 3 inches by 2 inches in size:

900 pixels÷300ppi=3 inches wide

600 pixels÷300ppi=2 inches high
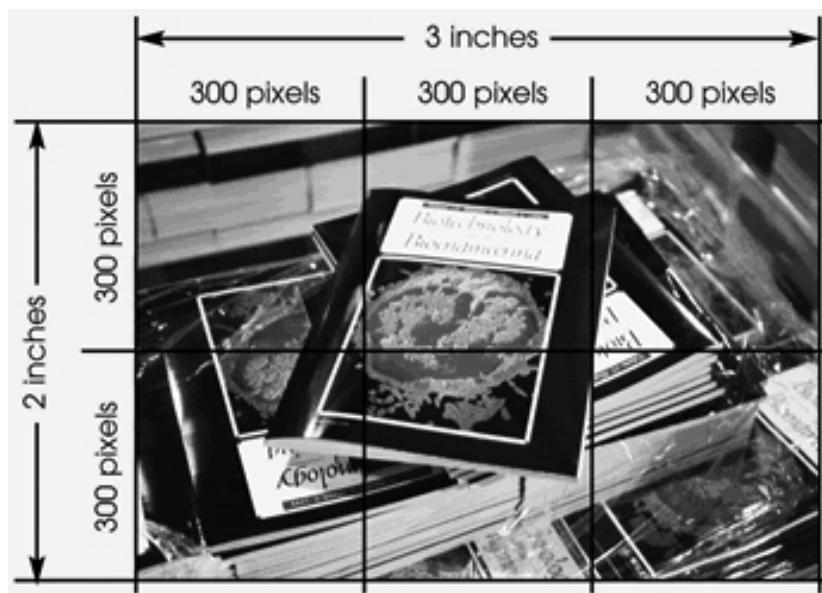
Fig 2.1: Image Classifications

Monochrome (1-bit) image resolution for images intended lithographic print is 900-1200ppi. In general, monochrome image resolution equivalent resolution output device. Output resolution for computer-to-plate devices (i.e., plate setters) typically is about 2400dpi; is realized when 2400ppi and 1200ppi monochrome images are compared, the range for monochrome image resolution is suggested as 900-1200ppi.

Tone image resolution recommended as 300ppi. This recommended resolution, suggested for other file types, intended for print

Combination tone image resolution 500-900ppi. and/or line art components, tones counter the effect however, higher resolution equates

physical file size. a compromise is achieved that balances the issues of aliasing and physical file size.

Fig. 2.2: Pixels

NOTE: When clicking between the high resolution image and the low resolution image, notice the differences in the edges of the cells, and the differences in the text at the bottom of the image.

Often times images are captured from Web sites or other methods that store images at 72 dpi (monitor resolution). When this low resolution image is printed, image detail will be lost, and the image will appear jagged.
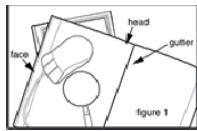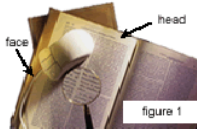
Raster images can be classified as either monochrome, tone, or combination tone. It is important to maintain minimum resolution settings for each file type. Low resolution images are one of the leading causes of art resubmission and schedule delays.

Monochrome (1-bit) images, typically scanned from line art and/or text originals, are comprised of a single bit of data. Since each bit (binary digit) can be represented only within a monochrome image can have only two states: black or white. Monochrome images generally require higher resolution (more pixels per inch) than tone images in order to prevent aliasing (stair-stepped appearance) of diagonal lines. The suggested minimum resolution for this type of image is between 900 and 1200 dpi. See the chart below for details.

Tones, typically captured from continuous-tone photographs, are comprised of 8-bit data (represented as 256 different levels for grayscale images). Color tones contain eight bits of data per channel (i.e., per color); thus, a CMYK tone contains 32 bits of information (and 256 levels each for cyan, magenta, yellow, and black). The suggested minimum resolution for this type of image is 300 dpi. See the chart below for details.

Combination tones contain both tone and Text/line art elements.

Consequently, like tones, combination tones are comprised of 8-bits of data per color channel. Thus, combination tones are saved as either grayscale or CMYK color mode. Because combination tones contain text/line art elements, however, the level of resolution employed must be compromised to address aliasing versus physical file size. The suggested minimum resolution for this type of image is between 500 and 900 dpi. See the chart below for details.

TYPE	EXAMPLE	FORMAT	COLOR MODE	RESOLUTION
B + W Line art		Tiff	Monochrome 1-bit	900-1200 dpi
Halftone		Tiff	Grayscale or CMYK	300dpi
Combo (Image+Type)		Tiff/Eps	Grayscale or CMYK	500 - 900 dpi
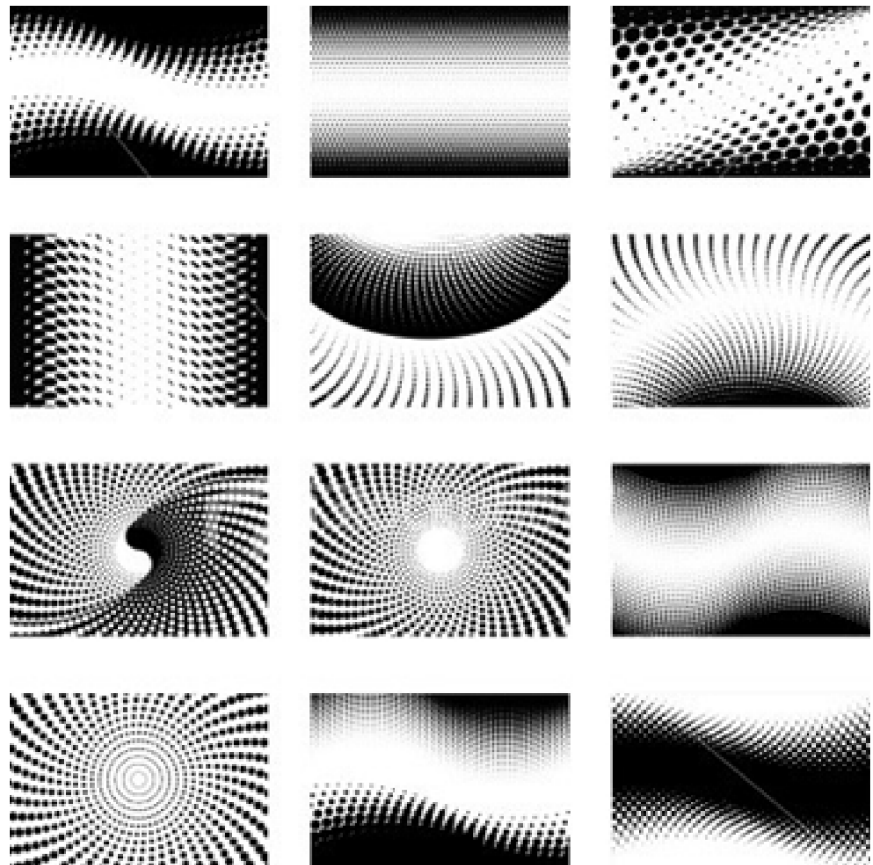
Fig 2.3: Resolution For Patterns
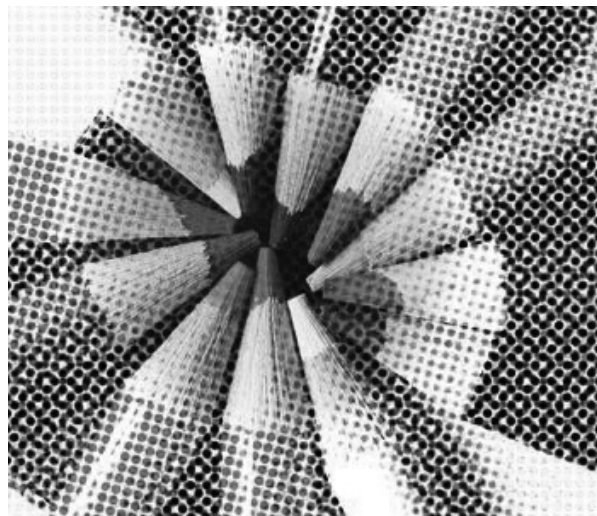
Fig 2.4: Texture Based Resolution

Since raster images have a specific resolution (i.e., a specific number of pixels per inch), scaling a raster image involves the distribution of available pixels across the designated space. Image resolution subsequent to scaling is referred to as effective resolution. If an image is enlarged, unless additional pixels have been added by means of interpolation (resampling), then accordingly the size of each pixel must be increased—consequently, the enlarged image will have fewer pixels per inch (lower

resolution). Conversely, if an image is reduced, unless existing pixels have been discarded (downsampling), the size of each pixel must be

Notes decreased (higher resolution). Although scaling reduction generally is less problematic regarding visible defects, unnecessary resolution can contribute to excessive physical file size. Cropping the scanned image to the size intended for print also will benefit toward the reduction of physical file size. If an image will require scaling, scanning resolution should be adjusted accordingly.

When placing and scaling images, you are changing what is known as the image effective resolution. Effective resolution is a calculation of the actual resolution factored for the scaling performed in the page layout application.

The math works out so that if you reduce the scale of an image in the page layout, you increase the effective resolution. As you increase the amount of scaling, you will decrease the effective resolution. The equation is:

(Actual Image Resolution) / (scale)% = Effective Resolution

Summary

- Image Resolution: Vector graphics -independent, their resolution is determined output device. (enlarging or reducing their size) simply requires modification of their component mathematical descriptions.

- Whereas vector graphics are resolution-independent, raster images are resolution-dependent—be defined. Consequently, raster image resolution is specified in pixels per inch (ppi)., image resolution commonly is referred to in dots per inch (dpi)—dpi more appropriately is attributed to device resolution or output resolution, where the number of dots an output device is able to produce within an inch represents the resolution of the device.

- By dividing the number of pixels in the height and in the width or bitmap by its resolution will determine the physical size of the im-

age—e.g., a 300ppi raster image that is 900 pixels wide and 600 pixels high is 3 inches by 2 inches in size:

- Monochrome (1-bit) image resolution for images intended lithographic print is 900-1200ppi. In general, monochrome image resolution equivalent resolution output device. Output resolution for computer-to-plate devices (i.e., plate setters) typically is about 2400dpi; is realized when 2400ppi and 1200ppi monochrome images are compared, the range for monochrome image resolution is suggested as 900-1200ppi.

- Tone image resolution recommended as 300ppi. This recommended resolution, suggested for other file types, intended for print

- Combination tone image resolution 500-900ppi. and/or line art components, tones counter the effect however, higher resolution equates physical file size. a compromise is achieved that balances the issues of aliasing and physical file size.

- Monochrome (1-bit) images, typically scanned from line art and/or text originals, are comprised of a single bit of data. Since each bit (binary digit) can be represented only within a monochrome image can have only two states: black or white. Monochrome images generally require higher resolution (more pixels per inch) than tone images in order to prevent aliasing (stair-stepped appearance) of diagonal lines. The suggested minimum resolution for this type of image is between 900 and 1200 dpi. See the chart below for details.

- Tones, typically captured from continuous-tone photographs, are comprised of 8-bit data (represented as 256 different levels for grayscale images). Color tones contain eight bits of data per channel (i.e., per color); thus, a CMYK tone contains 32 bits of information (and 256 levels each for cyan, magenta, yellow, and black). The suggested minimum resolution for this type of image is 300 dpi. See the chart below for details.

- Combination tones contain both tone and text/line art elements.

Consequently, like tones, combination tones are comprised of 8-bits of data per color channel. Thus, combination tones are saved as either grayscale or CMYK color mode. Because combination tones contain text/line art elements, however, the level of resolution employed must be compromised to address aliasing versus physical file size. The suggested minimum resolution for this type of image is between 500 and 900 dpi. See the chart below for details.

SCANNER RESOLUTION, DIGITAL PHOTOGRAPHY, STOCK PHOTOGRAPHY COMPANIES

❖ **Learning Objectives:**

· Here you will learn the resolution for scanner.

· Usage of digital photography in today's market

: Structure :

● Introduction

● Scanner resolution, Digital photography

● Stock photography companies

Introduction

The purpose of greater Scanning resolution is to create more pixels, to create a larger image size.

Scanners are the critical link between the non-digital and the digital world. Any picture or document can be turned into a digital format with a scanner. When looking for a scanner, you must make sure you get one good enough to do what you need it to do. But, you also should avoid overpaying for features you will not use. The first thing to look at is resolution.

Scanner Resolution, Digital Photography

Fig 3.1: Scanner

Step 1

Understand what scanner resolution is. Scanner resolution is measured by two numbers. The first number is the number of sensors the scanner uses to capture the image. The second number is the number of points the scanner stops at. The two numbers are usually the same.

Step 2

Look for a high first number. Because the first number measures the number of sensors; it's the more important number. Some scanners will advertise a resolution of 1200 by 2400, but these scanners do not necessarily produce a higher quality image than a scanner with a resolution of 1200 by 1200

Step 3

Consider the resolution of your printer before buying a scanner. If you're scanning images primarily to print them, note the resolution of your printer. Purchasing a scanner with a higher resolution than your printer is a waste because the quality of your images will be limited by your printer.

Step 4

Settle for a 300 by 300 resolution scanner for text. If you only need to capture text with you scanner, you can save some money and get a low-end scanner with a low resolution

Step 5

Move up to a 600 by 600 resolution scanner for most image applications. While more expensive scanners offer resolutions of 1200 by 1200 or 2400 by 2400, a resolution of 600 by 600 is adequate for capturing images for quality 4 by 6 or 5 by 7 prints

Step 6

Get a 1200 by 1200 or greater scanner only if you need to capture large images. Resolutions this high are not necessary unless you need to print 8 by 10 or larger images.

Fig 3.2: Scanning Options

Digital photography is a form of photography that uses digital technology to make images of subjects. Until the advent of such technology, photography used photographic film to create images which could be made visible by photographic processing. By contrast, digital photographs can be displayed, printed, stored, manipulated, transmitted, and archived using digital and computer techniques, without chemical processing.

Digital photography is one of several forms of digital imaging. Digital images are also created by non-photographic equipment such as computer tomography scanners and radio telescopes. Digital images can also be made by scanning conventional photographic images.

Fig 3.3: Digital Cameras

Sensors and storage

Image sensors read the intensity of light, and digital memory devices store the digital image information as RGB color space or as raw data.

There are two main types of sensors:

Charge-Coupled Device (CCD) – voltage converter photocharge is shifted to a central charge-to-

CMOS sensors ("Active pixel sensor")

Nearly all digital cameras use built-in and/or removable solid state flash memory. Digital tapeless camcorders that double as a digital still camera use flash memory, discs and internal hard drives. Certain 20th century digital cameras such as the Sony Mavica range used floppy disks and mini-CDs.

The quality of a digital image is a composite of various factors, many of which are similar to film cameras. Pixel count (typically listed in megapixels, millions of pixels) is only one of the major factors, though it is the most heavily marketed figure of merit. Digital camera manufacturers advertise this figure because consumers can use it to easily compare camera capabilities. It is not, however, the major factor in evaluating a digital camera for most applications. The processing system inside

the camera that turns the raw data into a color- balanced and pleasing photograph is usually more critical, which is why some 4+ megapixel cameras perform better than higher-end cameras.

Resolution in pixels is not the only measure of image quality; a larger sensor with the same number of pixels will generally produce a better image than a smaller one. One of the most important differences is an improvement in image noise. This is one of the advantages of digital SLR cameras, which have larger sensors than simpler cameras of the same resolution.

Lens quality: resolution, distortion, dispersion (see Lens (optics)) Capture medium: CMOS, CCD, negative film, reversal film etc.

Capture format: pixel count, digital file type (RAW, TIFF, JPEG), film format (135 film, 120 film, 5x4, 10x8).

Processing: digital and / or chemical processing of 'negative' and 'print'.

Fig 3.4: Images Resulting From Digital Cameras
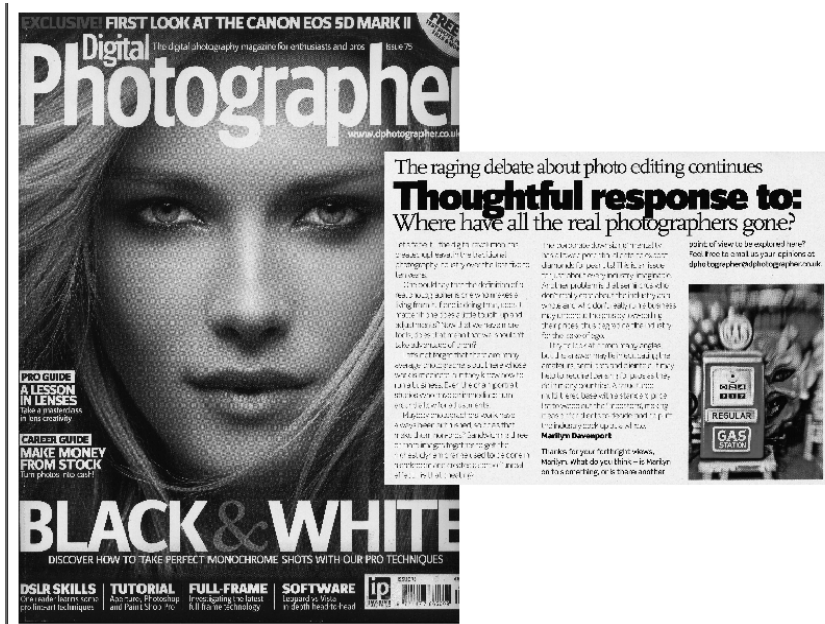
Fig 3.5: Images Resulting From Digital Cameras

Stock Photography Companies

Stock Photography Companies

Stock photography is the supply of photographs licensed for specific uses. It is used to fulfill the needs of creative assignments instead of hiring a photographer. Today, stock images can be presented in searchable online databases. They can be purchased and delivered online. Often, they are produced in studios using a wide variety of models posing as professionals, stereotypes, expressing stereotypical emotions and gesticulations or involving pets.

Fig 3.7: Collection Of Photographs

News papers and magazines were first able to reproduce Photographs instead of line drawings in the mid-1880s with the invention of the half-tone printing press.[1] Initially starting with staff photographers, eventually independent free-lance photographers took over.

Some stock photography sites offer low-resolution photography free for the purpose of preparing advertising comps to demonstrate a design. If the advertiser decides to use the image, the rights to use the high-resolution image then can be negotiated or purchased directly from the website.

Professional stock photographers place their images with one or more stock agencies on a contractual basis, with a defined commission basis and for a specified contract term. Some photographers fund their own photo shoots, or develop imagery in cooperation with an agency, while others submit photographs originally produced as part of editorial (magazine) or commercial assignments.

For many years, stock photography consisted largely of outtakes ("seconds") from commercial magazine assignments. By the 1980s, it had become a specialty in its own right, with photographers creating new material for the express purpose of submitting it to a stock house. Agencies attempted to become more sophisticated about following and anticipating the needs of advertisers and communicating these needs to photographers. Photographs were composed with more of an eye for how they might look when combined with other elements; for example,

a photo might be shot vertically with space at the top and down the left side, with the conscious intention that it might be licensed for use as a magazine cover.

Whether you shoot for fun, or are a class-act assignment photographer that shoots specialty subjects for a living, you may have considered the possibility of selling your images as stock photography—that is, selling your existing supply of photos to buyers who need them for catalogs, books, magazines, ads, or a variety of other uses. There's no question the opportunity is out there; the real question is whether you should do it yourself, or have someone else sell your images for you. If it were as easy as simply turning over images to someone else, there wouldn't be a whole lot say about it. Indeed, there are many factors, both pros and cons, associated with either choice of selling images directly yourself, or by working with an agency. In fact, many people do both.

One of the main determining factors will be your propensity for starting and running your own business as a fulltime endeavor. It's not that you have to do this to sell stock on your own, but if you make anything less than a seriously concerted effort, the payback may not seem worthwhile. Yet, even if you have what it takes to run your own business, it doesn't mean you'll want to. There are also lifestyle considerations: taking pictures is one thing; running a business is another. Doing them at the same time demands a different quality of time that is often incompatible with the photographer mindset. "Context switching" from the creative mind to the business mind is not easy or enjoyable for those who already find business a struggle to begin with.

For these and other reasons, it may be preferable to work with a stock photo agency. This is a company that markets and sells images on behalf of photographers in return for a percentage of the sales. In theory, this is a great win- win scenario, since the agency handles everything, leaving you to just go out and shoot as the money trickles in. In practice, it's not quite so simple.
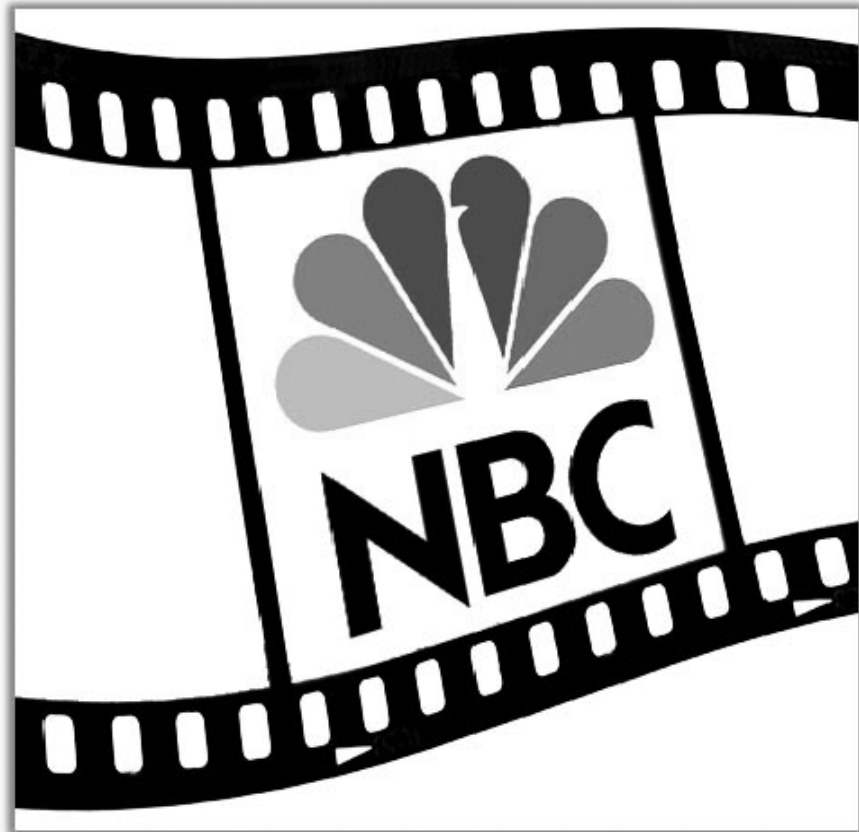
Fig 3.8: Stock Photography Logo

The evolution of stock photo agencies finds its roots in the days when the demand for photographs exceeded the supply, and the industry was better managed through a tiered network. This model operated quite well for decades, but the advent of the internet made it easier for photographers to get images to buyers, chopping one leg off of most agencies. Similarly, the advent of digital cameras made the supply of images grow—fast. This one-two punch resulted in a difficult time for agencies to compete against photographers. Most importantly, non-professional photographers, who provide the bulk of images to the internet. As these photos get worldwide distribution, they are seen, ranked, and index in some form or another via multitudes of websites, such as social networks and photo-sharing sites, making it increasingly easier for buyers to obtain images without the need for agencies. As a result, the lion's share of licensed images from the general public far and away exceeds those from stock agencies.

Photographers and agencies worried that royalty-free CDs would de-

stroy the stock industry, but they only eroded the bottom-end of the market, where very generic, medium-resolution images of everyday subjects reside. Those images hardly made much money anyway, but the carnage didn't end there. As revenue growth slowed from the booming levels of the mid-90s, so did the valuation of stock agencies. Bigger companies swallowed up smaller ones to reduce competition and increase image assets, to a point where there are now only a few big stock agencies today. Little ones pop up now and then, but usually don't survive long enough to gain a foothold, let alone present any sort of formidable competition to the major players.

Fig 3.9: Photography Image

Summary

· Digital photography is a form of photography that uses digital technology to make images of subjects

· Digital photography is one of several forms of digital imaging. Digital images are also created by non-photographic equipment such as computer tomography scanners and radio telescopes

· Resolution in pixels is not the only measure of image quality; a larger sensor with the same number of pixels will generally produce a better image than a smaller one

- Stock photography is the supply of photographs licensed for specific uses. It is used to fulfill the needs of creative assignments instead of hiring a photographer

- The evolution of stock photo agencies finds its roots in the days when the demand for photographs exceeded the supply, and the industry was better managed through a tiered network.

Block

3

PRINTING PROCESS AND PREPRESS LAUOUT

UNIT 1 PRINTING PROCESS

UNIT 2 LAYOUT PREPRESS

Acknowledgment

Every attempt has been made to trace the copyright holders of material reproduced in this book. Should an infringement have occurred, we apologize for the same and will be pleased to make necessary correction/amendment in future edition of this book.

The content is developed by taking reference of online and print publications that are mentioned in Bibliography. The content developed represents the breadth of research excellence in this multidisciplinary academic field. Some of the information, illustrations and examples are taken "as is" and as available in the references mentioned in Bibliography for academic purpose and better understanding by learner.'

ROLE OF SELF INSTRUCTIONAL MATERIAL IN DISTANCE LEARNING

The need to plan effective instruction is imperative for a successful distance teaching repertoire. This is due to the fact that the instructional designer, the tutor, the author (s) and the student are often separated by distance and may never meet in person. This is an increasingly common scenario in distance education instruction. As much as possible, teaching by distance should stimulate the student's intellectual involvement and contain all the necessary learning instructional activities that are capable of guiding the student through the course objectives. Therefore, the course / self-instructional material are completely equipped with everything that the syllabus prescribes.

To ensure effective instruction, a number of instructional design ideas are used and these help students to acquire knowledge, intellectual skills, motor skills and necessary attitudinal changes. In this respect, students' assessment and course evaluation are incorporated in the text.

The nature of instructional activities used in distance education self- instructional materials depends on the domain of learning that they reinforce in the text, that is, the cognitive, psychomotor and affective. These are further interpreted in the acquisition of knowledge, intellectual skills and motor skills. Students may be encouraged to gain, apply and communicate (orally or in writing) the knowledge acquired. Intellectual- skills objectives may be met by designing instructions that make use of students' prior knowledge and experiences in the discourse as the foundation on which newly acquired knowledge is built.

The provision of exercises in the form of assignments, projects and tutorial feedback is necessary. Instructional activities that teach motor skills need to be graphically demonstrated and the correct practices provided during tutorials. Instructional activities for inculcating change in attitude and behavior should create interest and demonstrate need and benefits gained by adopting the required change. Information on the adoption and procedures for practice of new attitudes may then be introduced.

Teaching and learning at a distance eliminates interactive communication cues, such as pauses, intonation and gestures, associated with the face-to-face method of teaching. This is particularly so with the exclusive use of print media. Instructional activities built into the instructional repertoire provide this missing interaction between the student and the teacher. Therefore, the use of instructional activities to affect better distance teaching is not optional, but mandatory.

Our team of successful writers and authors has tried to reduce this.

Divide and to bring this Self Instructional Material as the best teaching and communication tool. Instructional activities are varied in order to assess the different facets of the domains of learning.

Distance education teaching repertoire involves extensive use of self- instructional materials, be they print or otherwise. These materials are designed to achieve certain pre-determined learning outcomes, namely goals and objectives that are contained in an instructional plan. Since the teaching process is affected over a distance, there is need to ensure that students actively participate in their learning by performing specific tasks that help them to understand the relevant concepts. Therefore, a set of exercises is built into the teaching repertoire in order to link what students and tutors do in the framework of the course outline. These could be in the form of students' assignments, a research project or a science practical exercise. Examples of instructional activities in distance education are too numerous to list. Instructional activities, when used in this context, help to motivate students, guide and measure students' performance (continuous assessment)

PREFACE

We have put in lots of hard work to make this book as user-friendly as possible, but we have not sacrificed quality. Experts were involved in preparing the materials. However, concepts are explained in easy language for you. We have included many tables and examples for easy understanding.

We sincerely hope this book will help you in every way you expect.

All the best for your studies from our team!

Block 1:PRINTINGGRAPHICS

Unit 1   INTRODUCTION TO PRINTINGANDRESOLUTION

Learning Objectives:

- Here you will learn what is quality printing and whatc are should be taken for good quality printing
- What is resolution and Howre solutionworks
- What is printing process

UNIT2   RESOLUTION FOR GRAPHICS

Learning Objectives:

- Here you will learn the concept of optimaloutputre solution for images
- What does image resolution mean?
- Points to remember while printing.

UNIT3   RESOLUTION FOR PRINT MEDIA

Learning Objectives:

- Here you will learn the conceptofpixelperinchanddotsperinch
- Resolution For Images maximum ppi

Block 2: FILE FORMATS, SCANNING AND RESOLUTIONS

Unit 1   FILEFORMATS

Learning Objectives:

- Here you will learn the Preface Of perfect file format susedin graphics.
- Major types of file formats widely used for quality printing

UNIT 2 DETERMINING THE RESOLUTION FORIMAGES

Learning Objectives:

- Here you will learn the Preface Of monochromeandcombination tonesin resolutionwiththeffectsontexturesandpatterns.

UNIT3   SCANNER RESOLUTION, DIGITAL PHOTOGRAPHY, STOCK PHOTOGRAPHY COMPANIES

Learning Objectives:

- Hereyouwilllearntheresolutionforscanner.
- Usageofdigitalphotographyintoday'smarket

Block 3: PRINTING PROCESS AND PREPRESS LAUOUT

Unit 1   PRINTINGPROCESS

Learning Objectives:

· Here you will learn the Preface Of Printing process and various types of printingmethodsasperindustrystandards.

UNIT 2 LAYOUTPREPRESS

Learning Objectives:

· Here you will learn the process of printing press industry where by it shows how people are involve in publishingindustry

Block 4 :CONCEPT OF PRINTING PROCESS

Unit 1   PRINTING

Learning Objectives:

· Here you will learn all the concepts of printing, printers and modern machines.

UNIT 2 METHODS OF PRINTING

Learning Objectives:

· Here you will learn the Preface latest printing methods used in visual communicationandgraphicsprintmediaindustry.

❖ **Learning Objectives:**

· Here you will learn the Preface Of Printing process and various types of printing methods as per industry standards.

: Structure :

● Introduction

● Printing process

Introduction

Printing is a process for reproducing text and image, typically with ink on paper using a printing press. It is often carried out as a large-scale industrial process, and is an essential part of publishing and transaction printing.

Printmaking is the process of making artworks by printing, normally on paper. Printmaking normally covers only the process of creating prints with an element of originality, rather than just being a photographic reproduction of a painting. Except in the case of mono typing, the process is capable of producing multiples of the same pieces, which is called a 'print'.

Printing Process

Process For Reproducing Text And Image With Ink On Paper

Each piece produced is not a copy but considered 'an original' since it is not a reproduction of another work of art and is technically (more correctly) known as an 'impression'. Printmaking (other than mono typing) is not chosen only for its ability to produce multiple copies, but rather for the unique qualities that each of the printmaking processes lends itself to.

Prints are created from a single original surface, known technically as a matrix. Common types of matrices include: plates of metal, usually copper or zinc for engraving or etching; stone, used for lithography; blocks of wood for woodcuts, linoleum for linocuts and fabric plates for screen-printing.

An inkjet printer is a type of computer printer that reproduces a digital image by propelling variably-sized droplets of liquid material (ink) onto a page. Inkjet printers are the most common type of printer and range from small inexpensive consumer models to very large and expensive professional machines.

Fig 1.1: Printing Block

Offset printing is a widely used printing technique where the inked image is transferred (or "offset") from a plate to a rubber blanket, then to the printing surface. When used in combination with the lithographic process, which is based on the repulsion of oil and water, the offset technique employs a flat (planographic) image carrier on which the image to be printed obtains ink from ink rollers, while the non-printing area attracts a film of water, keeping the non- printing areas ink-free.

Currently, most books and newspapers are printed using the technique of offset lithography. Other common techniques include:

Flexography used for packaging, labels, newspapers. Hot wax dye transfer Inkjet used typically to print a small number of books or packaging, and also to print a variety of materials from high quality papers simulate offset printing, to floor tiles; Inkjet is also used to apply mailing addresses to direct mail pieces. laser printing mainly used in offices and for transactional printing (bills, bank documents). Laser printing is commonly used by direct mail companies to create variable data letters or coupons, for example. Pad printing is popular for its unique ability surfaces.print on complex 3-dimensional

Relief print, (mainly used for catalogues).

Rotogravure mainly used for magazines and packaging. Screen-printing from T-shirts to floor tiles

Fig 1.2: Printing Press

Gravure

Gravure printing is an intaglio printing technique, where the image to be printed is made up of small depressions in the surface of the printing plate. The cells are filled with ink and the excess is scraped off the surface with a doctor blade, then a rubber-covered roller presses paper onto

the surface of the plate and into contact with the ink in the cells. The printing plates are usually made from copper and may be produced by digital engraving or laser etching.

Gravure printing is used for long, high-quality print runs such as Magazines, mail-order catalogues, packaging, and printing onto fabric and wallpaper. It is also used for Printing postage stamps and decorative plastic laminates, such as kitchen worktops.

Fig 1.3:: Gravure Printing

GRAVURE PRINTING

Image for Process Printing – Separated Into Four Color Components-Cmyk (Known As Color Screening)

To make sure that the color separations are correct, during the prepress stage designers should print color separations on their desktop printer to insure colors will separate properly once sent to a commercial printer
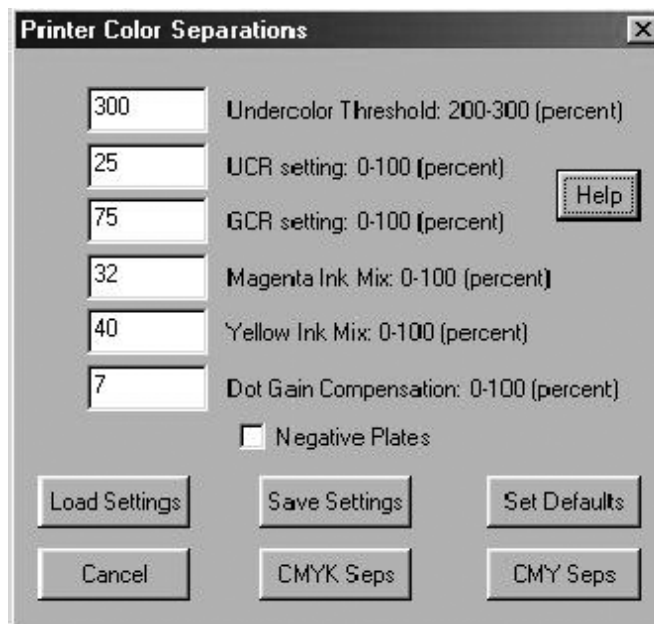
Fig 1.4: Color Separations

Creating color separations is a process that depends on a number of factors, from the source image, to the paper and the inks used, and all the steps in between. While it is definitely a science, not an "art", the process is complex enough and involves enough factors under the control of your print shop (and not you!) that good (or great!) results are reliably obtained only by those who have had some experience.

Beginning with a standard RGB image, the additive red, green and blue data is transformed into four (or very rarely, three, there is no black channel in this case) subtractive color channels: Cyan, Magenta, Yellow and Black. Or, C, M, Y, K: CMYK. These four subtractive colors can be reproduced on paper by inks of the same color (or as close as possible to the same colors.

Additive colors are colors that add together over black to create colors, where the addition of all the maximum color values makes white. This is true for an RGB image; adding 100% red, green and blue results in white.

Subtractive colors are colors that subtract from white to create colors, where the subtraction of all the maximum color values makes black. This is true for an CMY image; subtracting 100% cyan, magenta and yellow results in black.

Why use black at all? That's because the black that is created by CMY inks is sort of... muddy. It looks more brown than black. The math works fine, so CMY images on screen can be perfect, but the actual inks just don't mix that well when there's a whole bunch of ink of all three colors. So where an image has blacks, greys and darkish colors of all tonalties, typically, the CMY inks are not used as much, and instead black ink is used to "boost" the image into a darker appearance.

This results in very high denisity (good looking) dark colors of all types. One of the key elements of color separation is to decide exactly where to use black ink, and how much to use, and what that means in terms of reducing use of the CMY inks.
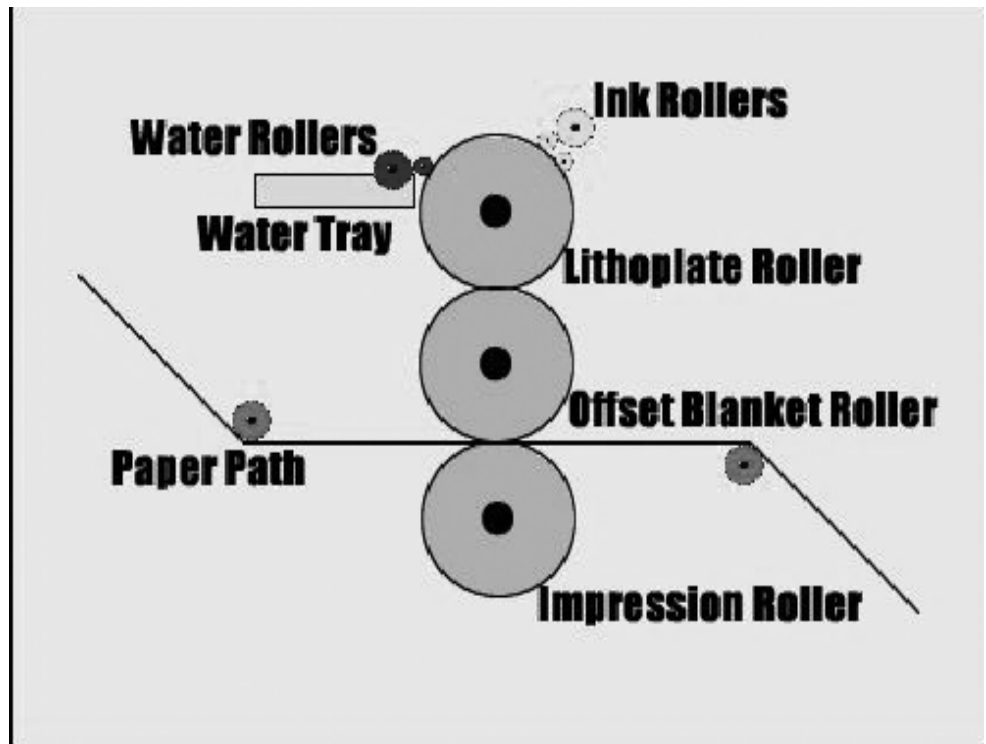
Fig 1.5: Print Process

More than 4 color separations

Additional ink colors are often added to make up for deficiencies in CMYK.

Recall that black was added to CMY to make up for deficiencies in typical CMY pigments. Other carefully chosen colors can be used to extend the CMYK gamut.

A larger set of primary colors can extend the process set to 6 or 7 colors. Examples are Pantone Hexa-chrome (orange and green), Scitex (red, green and blue) and Linotype Hell and others (orange, green, and violet or blue-violet).

Hexa-chrome includes modified CMY in addition to the new colors. This gives close matches with 90% of PMS patches.

Note that incremental benefit decreases with each additional color. Trans-Cal s HiFi ColorSeps support up to 18 colors, but a point of diminishing returns is reached with a much smaller number.

Color corrections - Color corrections are usually necessary at some stage of the process to Correct for input device.

Correct for output devices.

Correct for poor originals.

Satisfy the customer.
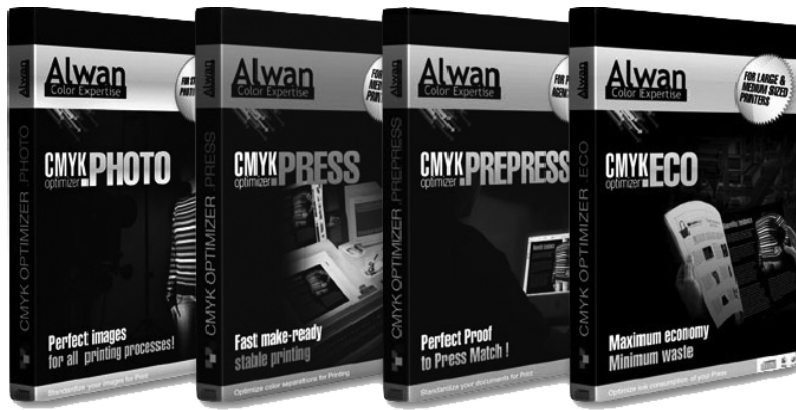
Fig 1.6: CMYK Color Seperation

Summary

Prints are created from a single original surface, known technically as a matrix. Common types of matrices include: plates of metal, usually copper or zinc for engraving or etching; stone, used for lithography; blocks of wood for woodcuts, linoleum for linocuts and printing. fabric plates for screen-

Offset printing is a widely used printing technique where the inked image is transferred (or "offset") from a plate to a rubber blanket, then to the printing surface.

Flexography used for packaging, labels, newspapers.

Hot wax dye transfer

Inkjet used typically to print a small number of books or packaging, and also to print a variety of materials from high quality papers simulate offset printing, to floor tiles; Inkjet is also used to apply mailing addresses to direct mail pieces.

laser printing mainly used in offices and for transactional printing (bills, bank documents).

LAYOUT PREPRESS

❖ **Learning Objectives:**

· Here you will learn the process of printing press industry where by it shows how people are involve in publishing industry

: Structure :

● Introduction

● Layout prepress

● Transaction printing

2.1 Introduction

Publishing is the process of production and dissemination of literature or information – the activity of making information available for public view. In some cases authors may be their own publishers, meaning: originators and developers of content also provide media to deliver and display the content.

Traditionally, the term refers to the distribution of printed works such as books (the "book trade") and newspapers. With the advent of digital information systems and the Internet, the scope of publishing has expanded to include electronic resources, such as the electronic versions of books and periodicals, as well as micropublishing, websites, blogs, video games and the like.

Layout Prepress

PUBLISHING PRINTING

Publishing includes: the stages of the development, acquisition, copyediting, graphic design, production – printing (and its electronic equivalents), and marketing and distribution of newspapers, magazines, books, literary works, musical works, software and other works dealing with information, including the electronic media.

Publication is also important as a legal concept: (1) as the process of giving formal notice to the world of a significant intention, for example, to marry or enter bankruptcy; (2) as the essential precondition of being able to claim defamation; that is, the alleged libel must have been published, and (3) for copyright purposes, where there is a difference in the

protection of published and unpublished works.

Book and magazine publishers spend a lot of their time buying or commissioning copy. At a small press, it is possible to survive by relying entirely on commissioned material. But as activity increases, the need for works may outstrip the publisher's established circle of writers.

Writers often first submit a query letter or proposal directly to a publisher according to submission guidelines or to a literary agent. Submissions sent directly to a publish r are referred to as unsolicited submissions. The majority of unsolicited submissions come from previously unpublished authors. When such manuscripts are unsolicited, they must go through the slush pile, which publisher's readers sift through to identify manuscripts of sufficient quality or revenue potential to be referred to acquisitions editors, who in turn refer their choices to the editorial staff. This process is dependent on the size of the publishing company, with larger companies having more degrees of assessment between unsolicited submission and publication. Unsolicited submissions have a very low rate of acceptance. Many book publishing companies around the world maintain a strict "no unsolicited submissions" policy and will only accept submissions via a literary agent. This shifts the burden on assessing and developing writers out of the publishing comp ny and onto the literary agents.

Fig 2.1: Prepress Industry

Before printing begins, a pre-press proof is created which is sent for final checking and sign-off by the publishing company. This proof shows the book precisely as it will appear once printed and is the final opportunity a publisher has to ensure there are no errors in the material. Some printing companies use electronic proofs rather than printed proofs. Once

the proofs have been signed off, printing of the book begins. Some copies of the finished book are flown to publishers as sample copies to aid sales or to be sent for pre-publication reviews. Remaining books often travel via sea freight. As such, the delay between proof and arrival of books in warehouse can be some months. For books which are tied into movie release dates (particularly children's films), publishers will arrange books to arrive in store up to two months prior to the movie release to build interest in the movie. A new printing process is 'Printing on Demand'. The book will be printed upon receipt of the order. This procedure ensures low costs for storage.

The publisher usually controls the advertising and other marketing tasks, but may subcontract various aspects of the process to specialist publisher marketing agencies. In many companies, editing, proofreading, layout, design and other aspects of the production process are done by freelancers

Dedicated in-house salespeople are sometimes replaced by companies who specialize in sales to bookshops, wholesalers and chain stores for a fee. This trend is accelerating as retail book chains and supermarkets have centralized their buying.

If the entire process up to the stage of printing is handled by an outside company or individuals, and then sold to the publishing company, it is known as book packaging. This is a common strategy between smaller publishers in different territorial markets where the company that first buys the intellectual property rights then sells a package to other publishers and gains an immediate return on capital invested. Indeed, the first publisher will often print sufficient copies for all markets and thereby get the maximum quantity efficiency on the print run for all.

Fig 2.2: Publishing House

The development of the printing press represented a revolution for communicating the latest hypotheses and research results to the academic community and supplemented what a scholar could do personally. But this improvement in the efficiency of communication created a challenge for libraries which have had to accommodate the weight and volume of literature.

To understand the scale of the problem, consider that approximately two

Centuries ago the number of scientific papers published annually was doubling every fifteen years. Today, the number of published papers doubles about every ten years. Modern academics now try to run electronic journals and distribute academic materials without the need for publishers.

One of the key functions that academic publishers provide is to manage the process of peer review. Their role is to facilitate the impartial assessment of research and this vital role is not one that has yet been usurped, even with an advent of social networking and online document sharing.

A digital printing system is attached to a computer database and many similar pages, called forms, are printed; each, for example, with a different person's data filling the form such as a monthly telephone or cable bill.

Transaction print jobs are different from 'publishing' print jobs in that the print controller does not know when the job will end when it starts. It may be printing a hundred, a thousand or a few million impressions before the 'job' ends. Many digital printing system's controllers are designed to ingest the entire job, arrange its resources according to the size of the job and then begin printing the job last page first so that what is produced is a 'book' with the user seeing the first page first. This 'publishing' model obviously does not work for 'transaction' printing and a controller using a different internal model for jobs must be used.

Prepress is the term used in the printing and publishing industries for the processes and procedures that occur between the creation of a print layout and the final printing. The prepress procedure includes the manufacture of a printing plate, image carrier or form, ready for mounting on a printing press, as well as the adjustment of images and texts or the creation of a high-quality print file. In today's prepress shop, the form of delivery from the customer is usually electronic, either a PDF or application files created from such programs as Adobe InDesign or QuarkXPress.

The following items have each been considered part of prepress at one time or another:

Typesetting involves the presentation of textual material in graphic form on paper or some other medium. Before the advent of desktop publishing, typesetting of printed material was produced in print shops by compositors or typesetters working by hand, and later with machines.

Copy-editing, is the work that an editor does to improve the formatting, style, and accuracy of a manuscript. Copy-editing is done prior to the work of proofreaders, who handle documents before final publication. Markup is an artificial language using a set of annotations to text that give instructions regarding the structure of text or how it is to be displayed. Markup languages have been in use for centuries, and in recent years have also been used in computer typesetting and word-processing systems.

Proofing involves creating an accurate facsimile of the artwork before beginning production runs. This serves as a bond between the printer and their customer that the final product meets an agreed upon standard. Proofs in general can be done for all parts (images, illustrations, texts and col-

ors) of print product. In this part, three types of proofing should be checked and printed out: the print- ready PDF files, the printer's proof and the imposition proof. Print-ready PDF files should be made after the layout using preflight at the printing house. The printer's proof should be printed out in high-resolution and checked by the customer. The imposition proof, which is usually done by the printers, should also be printed out to check and adjust the printing press.

Proofreading traditionally means reading a proof copy of a text in order to detect and correct any errors. Modern proofreading often requires reading copy at earlier stages as well.

Screening and adjustment of a continuous-tone of images such as photographs Imposition, or the combination of many pages into a single signature form.

Separation, or specifying images or text to be put on plates applying individual printing media (inks, varnishes, etc.) to a common print.

Manufacturing of plates The usage of different materials of plates should meet the needs of printing method. Usually rubber, plastic, aluminum are used for plates as well as film which is the photomechanical exposure and processing of light-sensitive emulsion on a printing plate. Manufacturing of plates should be

Notes well planned and delivered beforehand. Also, the cost should be calculated as well.

Manufacturing of a high-quality print (PDF) file, this is used for the final printing. Paper selection, choosing a proper paper is also a very important step in prepress.

In most modern publishing environments, the tasks related to content generation and refinement are carried out separately from other prepress tasks, and are commonly characterized as part of graphic design. Some companies combine the roles of graphic design and prepress production into desktop publishing usually called DTP.

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), the final product (books, newspapers, product packaging), and the implementation of specific prepress technologies. For example, it is not uncommon to use a computer and image-setter 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 an analog one. That demonstrates that the borders around the prepress are very fluid. Furthermore – depending on the printing method and the print product – the elements of the prepress of a graphic print production can differ from case to case. This circumstance requires a management of the workflow. It is necessary to manage the responsibility for each part of the workflow. That can mean that employees, who are actually responsible for other parts of the production (e.g. Layout), have to attend to parts of the prepress.

During the 1980s and 1990s, computer-aided prepress techniques began to supplant the traditional dark room and light table processes, and by the early 2000s the word prepress became, in some ways, synonymous with digital prepress. Immediately before the mainstream introduction of computers to the

process, much of the industry was using large format cameras to make emulsion- based (film) copies of text and images. This film was then assembled (stripping) and used to expose another layer of emulsion on a plate, thus copying images from one emulsion to another. This method is still used; however, as digital prepress technology has become less cost intensive, more efficient and reliable, and as the knowledge and skill required to use the new hardware and especially software have become more widespread within the labor force, digital automation has been introduced to almost every part of the process. Some topics related to digital but not analog prepress include pre-flighting (verifying the presence, quality and format of each digital component), color management, and ripping.

PDF workflows also became predominant. Vendors of Prepress systems, in addition to the offset printing industry, embraced a subset of the PDF format referred to as PDF/X1-a. This industry specific subset is one version of the PDF/X (PDF for eXchange) set of standards.

In more recent years, prepress software has been developed which is designed to find as many efficiencies in prepress workflow as possible. These tools are accessed online, and allow different workers to work on one project at the same time, often from different locations. Key functionality automates common steps to reduce errors, reinforce quality

standards and speed up production. Examples include automatically re-folioing pages, digital dummies for soft proofs, live linking with Adobe InDesign and pre-flight checking. These tools revolve around a Flat plan and are used in all sorts of prepress including book, magazine and catalog production.

Transaction Printing

Transaction Printing describes a mode of submitting a job to a printing device. A digital printing system is attached to a computer database and many similar pages, called forms, are printed; each, for example, with a different person's data filling the form such as a monthly telephone or cable bill.

Transaction print jobs are different from 'publishing' print jobs in that the print controller does not know when the job will end when it starts. It may be printing a hundred, a thousand or a few million impressions before the 'job' ends. Many digital printing system's controllers are designed to ingest the entire job, arrange its resources according to the size of the job and then begin printing the job last page first so that what is produced is a 'book' with the user seeing the first page first. This 'publishing' model obviously does not work for 'transaction' printing and a controller using a different internal model for jobs must be used.

Transaction printing and direct mail is challenging work. Regardless of the business you are in, you have to squeeze the ultimate out of your equipment and applications to achieve the highest possible customer response. For corporate organizations – banks and insurance companies, for example – transaction documents such as account statements and policies are the backbone of the entire business. They bring in vital revenues and keep the organization in touch with customers and suppliers. In difficult economical times, transactional printing and direct mail also lets you exploit your resources to the full by allowing you to analyze your processes, cost factors and spend more thoroughly, thus improving management and retention of clients.

The variable data printing market has always been digital – but with high speed color abilities expanding application style and scope, customers are now looking for ways to utilize these technologies – and raise overall ROI expectations.

You can deliver by leading on cost and speed – by improving production

efficiencies and quickening turnarounds, or differentiating with new products and services. Océ helps you forge new paths, with concepts such as job- appropriate printing of black & white, highlight color or full color documents with variable text, images, and graphics based on the objectives and economics of the job, or Trans Promo solutions for combining transaction documents with relevant customer-specific communications elements.

Fig 2.3: Transaction Printing

Examples Of Print Outs

Fig 2.4: Plate 1

Fig 2.5: Plate 2

COMMUNITY GATHERING

The WA State Supreme Court has ruled _against_ Marriage Equality and _in favor_ of discrimination

The judges failed to do their job.
Now it's up to the legislature
to end this discrimination.

And it's <u>up to us</u> to raise our voices
and speak out for marriage equality.

Come hear from organizers and elected officials about:
- the background of the case
- what the decision means
- what the next steps are

Q&A session will follow

CAL ANDERSON PARK THIS SUNDAY 30th 2PM

Cal Anderson Park is in Capitol Hill, at 11th Ave E and E Olive St. The gathering will take place next to the ball field on the south end of the park. Limited on-street parking is available. Or take Metro bus routes 8, 9, 10, 11, 12, 43, 49, or 60, and use the Pine and Broadway bus stop; park is one block east.
ASL interpretation is available upon request.
Please email info@marriageequalitynow.org for more information.

MARRIAGE EQUALITY NOW

Fig 2.6: Plate 3

Fig 2.7: Plate 4

Fig 2.8: Plate 5

Fig 2.9: PLATE 6

Fig 2.10: Plate 7

Planning critical to joint exercises

By Senior Airman Justin Weaver
31st Fighter Wing Public Affairs

Coalition and American pilots, aircrews and support members have to be trained to fight the enemy anytime, anyplace. To ensure mission success, servicemembers participate in large force exercises to hone joint fighter skills.

Pilots from the 555th Fighter Squadron, the 510th FS and Grosseto air base are scheduled to participate in a large force exercise today, one of the largest joint training exercises in the base's history.

"You have to extensively mission plan for an exercise like this," said Capt. Nate Aysta, 555th FS pilot who coordinated all the mission planning, briefing, flying, and execution of the mission. "The pilots have to plan on how to get to the airspace, how to defeat the enemy aircraft, how to find and destroy any targets on the ground without getting shot down by surface-to-air threats and finally, get back to friendly territory."

Ensuring the pilots' mission is successful takes the combined coordination of numerous units on base.

"The 31st Operations Support Squadron weather flight briefs us on the expected weather for the mission, and depending on what they brief, impacts how we fight the 'war,'" Captain Aysta said. "Our [Intelligence] folks also brief us on the simulated war and what threats we will be facing."

In order for the fighter pilots to accomplish their mission in the air, they have to rely heavily on the maintenance Airmen on the ground who maintain and keep each jet mission-ready.

"The maintainers have to get the proper amount of aircraft ready with the correct configurations and be able to launch a large number of aircraft in a short amount of time," Captain Aysta said. "The air traffic control tower and the radar approach facility Airmen also get a chance to control a large amount of aircraft in a short amount of time."

Pilots participating in the LFE also have the opportunity to practice mid-air refueling during the mission.

"We coordinated an air refueling tanker out of England to give us gas while airborne," said Captain Aysta, who has

Celebrities scheduled to visit Aviano

By Senior Airman Justin Weaver
31st Fighter Wing Public Affairs

Aviano Team members and their families will be treated to quite an impressive show 1 p.m. Dec. 22 in Hangar 1.

The United Service Organizations, which provides morale, welfare and recreation-type services to uniformed military personnel, is hosting Lance Armstrong, Lewis Black, Kid Rock, Miss USA Rachel Smith, and Robin Williams for the day-long tour at Aviano.

"Everyone is invited to attend, but seating will be on a first come, first served basis," said Susan Lear, community center director. "We highly encourage people to car pool as parking is limited."

There is no need to purchase tickets and the doors will open at 12:30 p.m.

"This is a great opportunity for Team Aviano to enjoy live entertainment and meet people they wouldn't normally meet," said Capt. Jeff Elliott, 31st Services Squadron acting commander. "All members of the Armed Forces have been affected by the USO some way or another, whether it is a morale event such as this, assistance at a deployed location or a friendly face at the airport when arriving at a new location ... USO deserves a big THANKS."

A meet and greet is tentatively scheduled after the show. For more information, call Mrs. Lear at 632-5479.

Off-limit areas set in Vicenza Saturday, Sunday

The following off-limits restrictions apply to all U.S. Armed Forces personnel (military, civilian employees, and family members) during the planned demonstrations to be held in Vicenza Saturday and Sunday. These off-limits restrictions are in effect from 6 a.m. on Saturday until 6 p.m.

Sunday. **The following prohibitions apply to each zone:**

a. Red Zone: Off-limits to all personnel, except for emergency travel. Personnel who reside in this zone are restricted to their quarters, except for emergency travel, or they must leave the area completely.

b. Amber Zone: Extreme caution should be used in this zone.

c. Green Zone: Freedom of movement not restricted in this area.

See **Page 16** for an off-limits map of Vicenza.

Fig 2.11: Plate 8

Fig 2.12: Plate 9

UPSAMPLING

- Up sampling is when a low resolution image is saved to a higher resolution with no changes in dimensions.

  Notes : This process adds more pixels squares in an inch (dpi), but creates blurry images, ugly blocks of color, and high contrast in images. Up sampling will not produce clear and crisp printing results on a printing press.
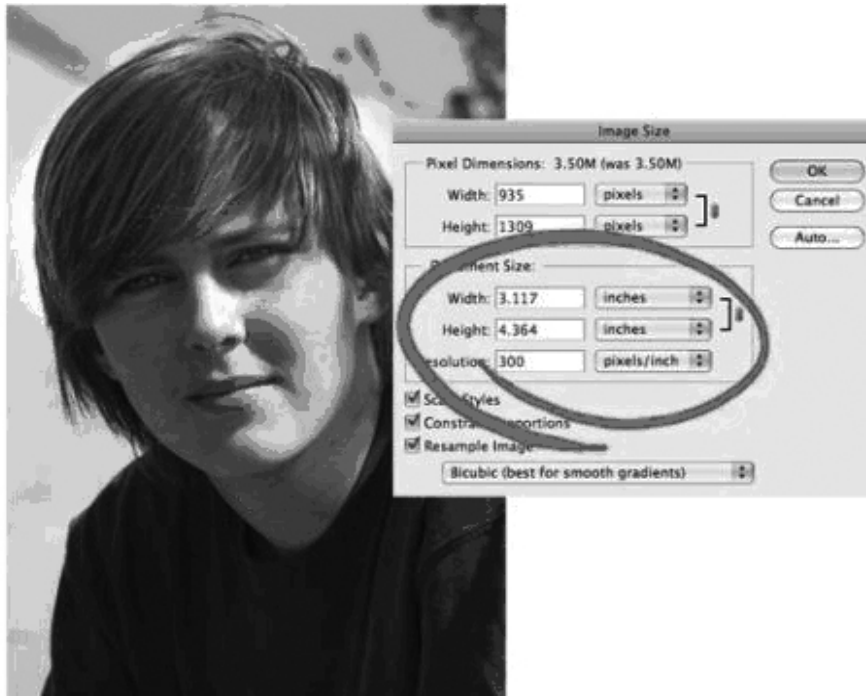
Fig 2.13: Up Sampling An Image In Photoshop

72 dpi image Up-sampled to 300dpi

- This will not print well on press.

- JPEG and Gif files are Internet images, saved with a compression process designed to remove color and visual quality to achieve small file sizes. Internet images are usually saved at a resolution of 72 dpi for quick screen loads and will not print clear and crisp on a printing press.

RULES TO REMEMBER

- Text should be 400dpi at the final size in the layout.

- Images should be 300dpi at the final size in the layout.

- Resolution and size (dimensions) are inversely proportional to each other. So, if you enlarge an image, you lower its resolution. If you reduce an image, you increase its resolution.

How an image is originally acquired will determine its resolution, and thus the size it can print at for clear and crisp printing.
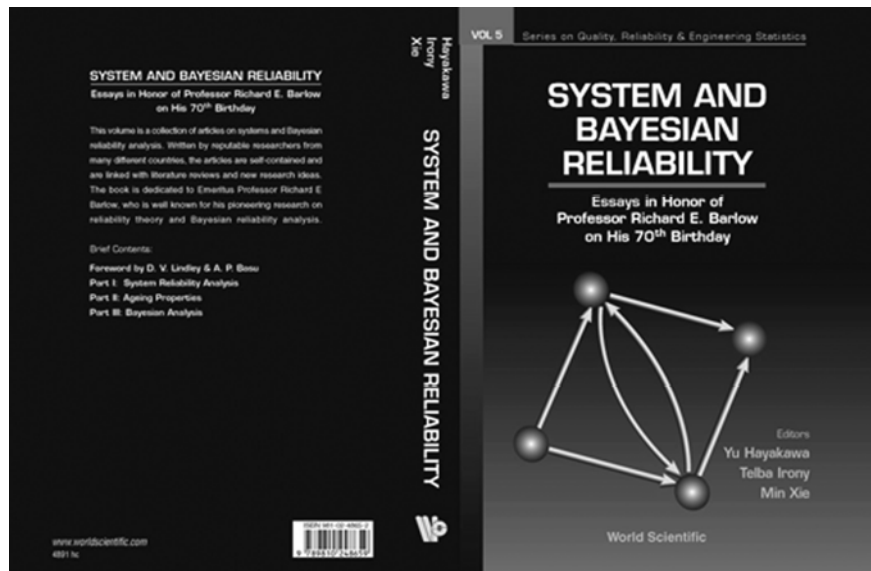
Fig 8.14: Book Cover
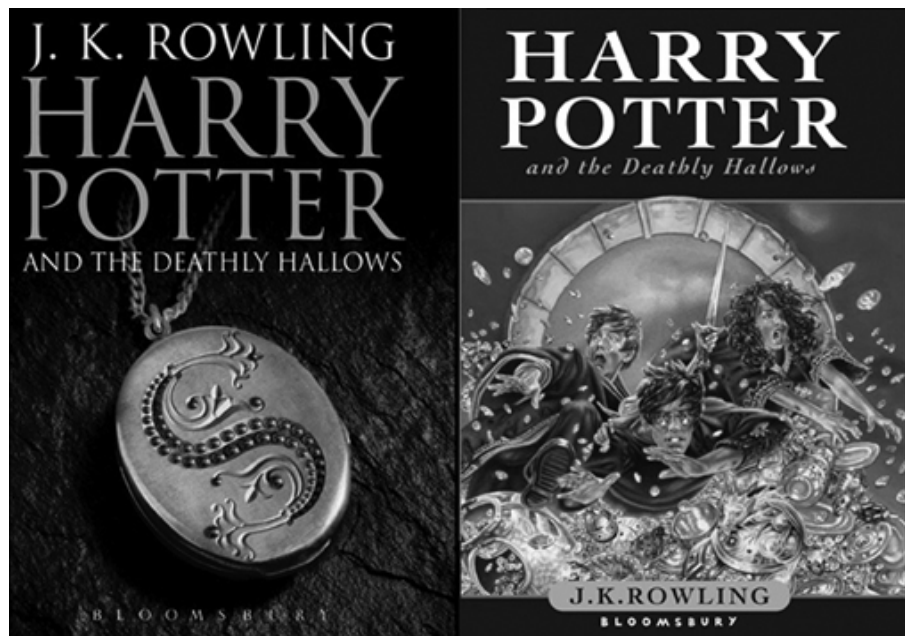
Fig 2.15: Book Cover

Summary

- Publishing includes: the stages of the development, acquisition, copyediting, graphic design, production – printing (and its electronic equivalents), and marketing and distribution of newspapers, magazines, books, literary works, musical works, software and other works dealing with information, including the electronic media.

- Before printing begins, a pre-press proof is created which is sent for final checking and sign-off by the publishing company

- The publisher usually controls the advertising and other marketing tasks

- Prepress is the term used in the printing and publishing industries for the processes and procedures that occur between the creation of a print layout and the final printing.

- Copy-editing, is the work that an editor does to improve the formatting, style, and accuracy of a manuscript.

- Prepress is the term used in the printing and publishing industries for the processes and procedures that occur between the creation of a print layout and the final printing.

- Transaction Printing describes a mode of submitting a job to a printing device.

**Dr. Babasaheb
Ambedkar
Open University**

**BCADES-103
PRINTING &
RESOLUTION**

Block

4

CONCEPT OF PRINTING

UNIT 1 PRINTING

UNIT 2 METHOD OF PRINTING

Acknowledgment

Every attempt has been made to trace the copyright holders of material reproduced in this book. Should an infringement have occurred, we apologize for the same and will be pleased to make necessary correction/ amendment in future edition of this book.

The content is developed by taking reference of online and print publications that are mentioned in Bibliography. The content developed represents the breadth of research excellence in this multidisciplinary academic field. Some of the information, illustrations and examples are taken "as is" and as available in the references mentioned in Bibliography for academic purpose and better understanding by learner.'

ROLE OF SELF INSTRUCTIONAL MATERIAL IN DISTANCE LEARNING

The need to plan effective instruction is imperative for a successful distance teaching repertoire. This is due to the fact that the instructional designer, the tutor, the author (s) and the student are often separated by distance and may never meet in person. This is an increasingly common scenario in distance education instruction. As much as possible, teaching by distance should stimulate the student's intellectual involvement and contain all the necessary learning instructional activities that are capable of guiding the student through the course objectives. Therefore, the course / self-instructional material are completely equipped with everything that the syllabus prescribes.

To ensure effective instruction, a number of instructional design ideas are used and these help students to acquire knowledge, intellectual skills, motor skills and necessary attitudinal changes. In this respect, students' assessment and course evaluation are incorporated in the text.

The nature of instructional activities used in distance education self- instructional materials depends on the domain of learning that they reinforce in the text, that is, the cognitive, psychomotor and affective. These are further interpreted in the acquisition of knowledge, intellectual skills and motor skills. Students may be encouraged to gain, apply and communicate (orally or in writing) the knowledge acquired. Intellectual- skills objectives may be met by designing instructions that make use of students' prior knowledge and experiences in the discourse as the foundation on which newly acquired knowledge is built.

The provision of exercises in the form of assignments, projects and tutorial feedback is necessary. Instructional activities that teach motor skills need to be graphically demonstrated and the correct practices provided during tutorials. Instructional activities for inculcating change in attitude and behavior should create interest and demonstrate need and benefits gained by adopting the required change. Information on the adoption and procedures for practice of new attitudes may then be introduced.

Teaching and learning at a distance eliminates interactive communication cues, such as pauses, intonation and gestures, associated with the face-to-face method of teaching. This is particularly so with the exclusive use of print media. Instructional activities built into the instructional repertoire provide this missing interaction between the student and the teacher. Therefore, the use of instructional activities to affect better distance teaching is not optional, but mandatory.

Our team of successful writers and authors has tried to reduce this.

Divide and to bring this Self Instructional Material as the best teaching and communication tool. Instructional activities are varied in order to assess the different facets of the domains of learning.

Distance education teaching repertoire involves extensive use of self- instructional materials, be they print or otherwise. These materials are designed to achieve certain pre-determined learning outcomes, namely goals and objectives that are contained in an instructional plan. Since the teaching process is affected over a distance, there is need to ensure that students actively participate in their learning by performing specific tasks that help them to understand the relevant concepts. Therefore, a set of exercises is built into the teaching repertoire in order to link what students and tutors do in the framework of the course outline. These could be in the form of students' assignments, a research project or a science practical exercise. Examples of instructional activities in distance education are too numerous to list. Instructional activities, when used in this context, help to motivate students, guide and measure students' performance (continuous assessment)

PREFACE

We have put in lots of hard work to make this book as user-friendly as possible, but we have not sacrificed quality. Experts were involved in preparing the materials. However, concepts are explained in easy language for you. We have included many tables and examples for easy understanding.

We sincerely hope this book will help you in every way you expect.

All the best for your studies from our team!

Image Editing and Processing

Block 1: PRINTING GRAPHICS

Unit 1 INTRODUCTION TO PRINTING AND RESOLUTION

Learning Objectives:

- Here you will learn what is quality printing and whatc are should be taken for good quality printing
- What is resolution and Howre solutionworks
- What is printing process

UNIT2 RESOLUTION FOR GRAPHICS

Learning Objectives:

- Here you will learn the concept of optimaloutputre solution for images
- What does image resolution mean?
- Points to remember while printing.

UNIT3 RESOLUTION FOR PRINT MEDIA

Learning Objectives:

- Here you will learn the conceptofpixelperinchanddotsperinch
- Resolution For Images maximum ppi

Block 2: FILE FORMATS, SCANNING AND RESOLUTIONS

Unit 1 FILEFORMATS

Learning Objectives:

- Here you will learn the Preface Of perfect file format susedin graphics.
- Major types of file formats widely used for quality printing

UNIT 2 DETERMINING THE RESOLUTION FORIMAGES

Learning Objectives:

- Here you will learn the Preface Of monochromeandcombination tonesin resolutionwitheffectsontexturesandpatterns.

UNIT3 SCANNER RESOLUTION, DIGITAL PHOTOGRAPHY, STOCK PHOTOGRAPHY COMPANIES

Learning Objectives:

- Hereyouwilllearntheresolutionforscanner.
- Usageofdigitalphotographyintoday'smarket

Block 3: PRINTING PROCESS AND PREPRESS LAUOUT

Unit 1   PRINTINGPROCESS

Learning Objectives:

- · Here you will learn the Preface Of Printing process and various types of printingmethodsasperindustrystandards.

UNIT 2   LAYOUTPREPRESS

Learning Objectives:

- · Here you will learn the process of printing press industry where by it shows how people are involve in publishingindustry

Block 4 :CONCEPT OF PRINTING PROCESS

Unit 1   PRINTING

Learning Objectives:

- · Here you will learn all the concepts of printing, printers and modern machines.

UNIT 2   METHODS OF PRINTING

Learning Objectives:

- · Here you will learn the Preface latest printing methods used in visual communicationandgraphicsprintmediaindustry.

<table>
<tr><td>**UNIT
1**</td><td>**PRINTING**</td></tr>
</table>

❖ **Learning Objectives:**

· Here you will learn all the concepts of printing, printers and modern machines

: Structure :

● Introduction

● Printing

● Various types of printers

Introduction

Printing is a process for producing text and image, basically on ink and paper using printing press.

• Most design applications have the option to work in either RGB or CMYK color models. We are capable of accepting both formats since we utilize automated preflight and correction tools. This is just one step we take at Printing Center USA to help ensure the color in the file provided is correct before going to press.

• RGB and CMYK are the standard color models used in the creation of digital graphics and commercial printing.

Printing

Red, Green and Blue are the primary colors of light used on computer monitors, television screens, scanners and digital cameras. These colors are additive and when combined create white.

Fig 1.1.: Printing Offset

RGB AND CMYK PRINTING

CMYK   **RGB**

Fig 1.2.: Color Mode
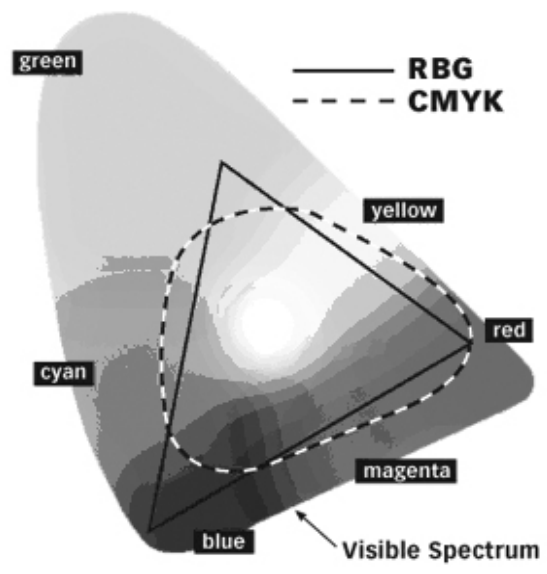
Fig 1.3.: GAMUT

·   The CMYK and RGB formats produce only a selective gamut of the full spectrum of colors. The gamut range of each, however, differs.

- Consequently, converting between RGB and CMYK can cause a color shift. Some areas of the RGB color space extend beyond the range of the CMYK color space. These are the colors that will be affected by the conversion.

- Colors that are out of the CMYK gamut are converted using an industry standard conversion that matches the appearance as closely as possible. It is likely that any color shifting between RGB and CMYK won't even be noticed.

If you are concerned, you may consider requesting a hard copy proof as it is your best representation of the final printed piece.
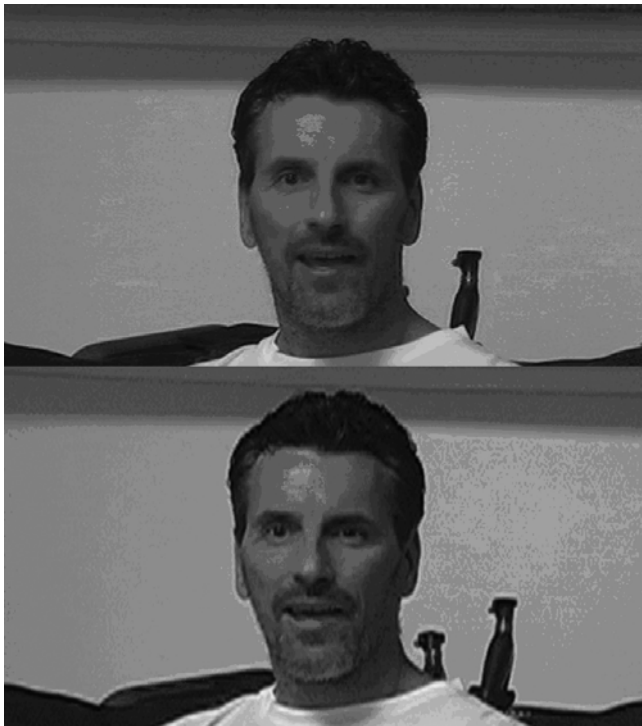
Fig 1.4.: CMYK Mode

PRESSES AND OFFSET PRINCIPLES
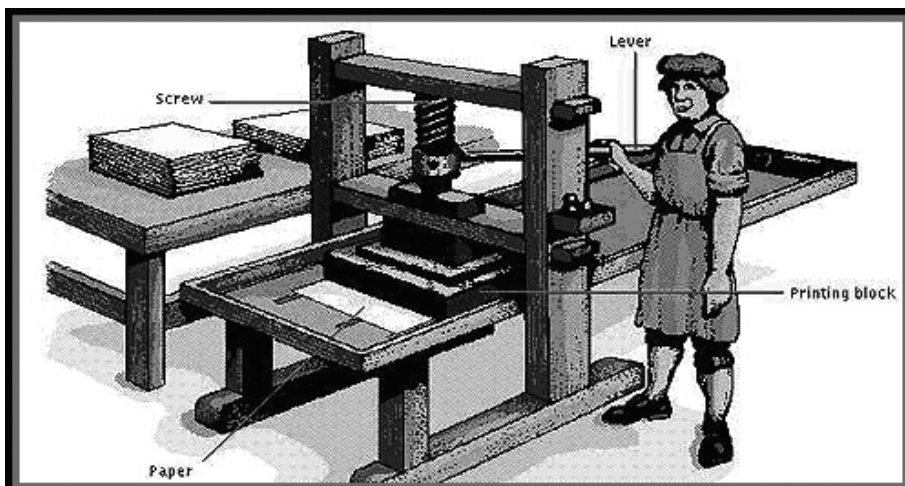
Fig 1.5.: Traditional Printing
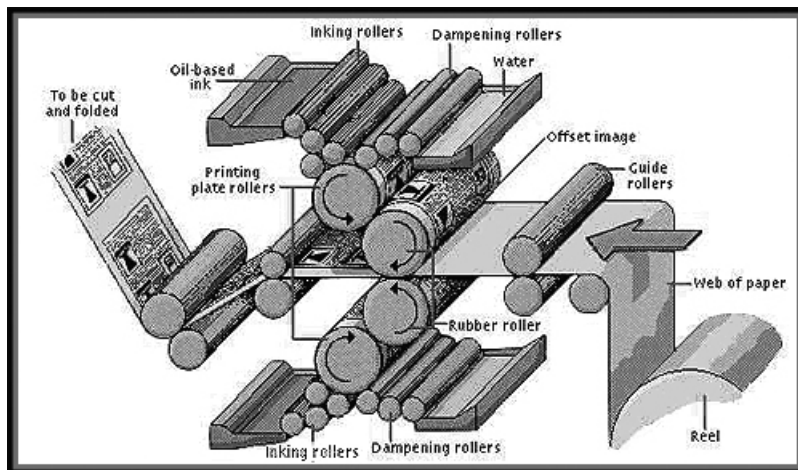
Fig 1.6.: Log Printing

Fig 1.7.: Modern Machines

Fig 1.8.: Printers

A printing press is a mechanical device for applying pressure to an inked surface resting upon a print medium (such as paper or cloth), thereby transferring an image, typically a text. The invention and spread of the printing press is widely regarded as the most influential event in the second millennium AD, revolutionizing the way people conceive and describe the world they live in, and ushering in the period of modernity.

The mechanical systems involved were first assembled in the Holy Roman Empire by the German Johannes Gutenberg around 1440, based on

existing screw presses. Gutenberg, a goldsmith by profession, developed a complete printing system, which perfected the printing process through all its stages by adapting existing technologies to printing purposes, as well as making ground-breaking inventions of his own. His newly devised hand mould made for the first time possible the precise and rapid creation of metal movable type in large quantities, a key element in the profitability of the whole printing enterprise.

The mechanization of bookmaking led to the first mass production of books in history in assembly line-style. A single Renaissance printing press could produce 3.600 pages per workday, compared to forty by hand-printing and a few by hand-copying. Books of bestselling authors like Luther or Erasmus were sold by the hundred thousand in their lifetime.

Fig 1.9.: Lithography Press

Printing processes such as offset lithography use printing plates to transfer an image to paper or other substrates. The plates may be made of metal, plastic, rubber, paper, and other materials. The image is put on the printing plates using photomechanical, photochemical, or laser engraving processes. The image may be positive or negative.

Typically, printing plates are attached to a cylinder in the press. Ink is applied to the plate's image area and transferred directly to the paper or to an intermediary cylinder and then to the paper. In screen printing, the screen is n equivalent of the printing plate. It can be created manually or photochemically and is use all a porous fabric or stainless steel mesh stretched over a frame.
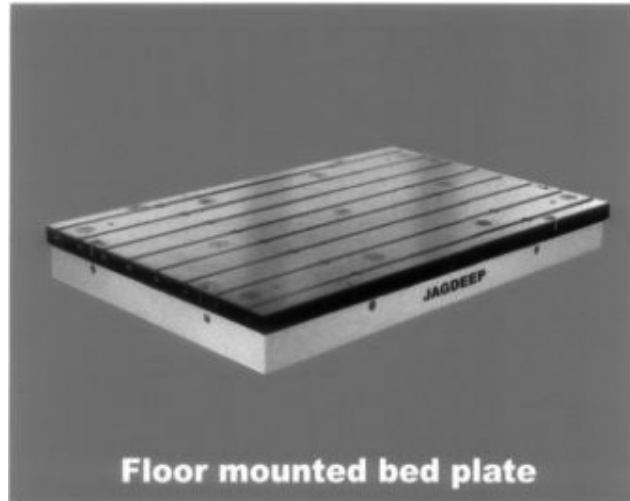
Fig 1.10.: Mounted Bed Plate

Fig 1.11.: Printing Plates

The printing plates used depends on the type of press, the printing method, and quantity of the print run. A plate is prepared for each color used, or four plates in the case of 4-color (CMYK) process printing. In general, metal plates are more expensive but last longer and have greater accuracy. Paper plates are usually more suitable for shorter runs without close or touching colors.

An ink cartridge or inkjet cartridge is a replaceable component of an inkjet printer that contains the ink (and sometimes the print-head itself) that is spread on paper during printing. Each ink cartridge contains one or more partitioned ink reservoirs; certain manufacturers also add electronic contacts and a chip that communicates with the printer.

Typically, two separate cartridges are inserted into a printer: one containing black ink and one with each of the three primary colors. Alternatively, each primary color may have a dedicated cartridge.

Some cartridges contain ink specially formulated for printing photographs.

All printer suppliers produce their own type of ink cartridges. Cartridges for different printers may be incompatible — either physically or electrically.

Since replacement cartridges from the original manufacturer of the printer are often expensive, several vendors produce "compatible" cartridges as less expensive alternatives. These cartridges sometimes have more ink than the original OEM branded ink cartridges and may produce the same, better, or inferior quality, depending on a variety of factors, including the vendor's ability to duplicate the ink formulation in all respects.

Some cartridges have incorporated the printer's head (examples include HP, Dell, and Lexmark). The precision parts required generally make the cartridges more expensive, but the printers are cheaper since they don't include the precision print head. Other cartridges don't include the print head and so can cost less, though the printers tend to be somewhat more expensive (Epson is an example).

In computing, a printer is a peripheral which produces a hard copy (permanent readable text and/or graphics) of documents stored in electronic form, usually on physical print media such as paper or transparencies. Many printers are primarily used as local peripherals, and are attached by a printer cable or, in most newer printers, a USB cable to a computer which serves as a document source. Some printers, commonly known as network printers, have built-in network interfaces (typically wireless and/or Ethernet), and can serve as a hardcopy device for any user on the network. Individual printers are often designed to support both local and network connected users at the same time. In addition, a few modern printers can directly interface to electronic media such as memory sticks or memory cards, or to image capture devices such as digital cameras, scanners; some printers are combined with a scanners and/or fax machines in a single unit, and can function as photocopiers.

Fig 1.12.: A Lexmark Printer

A Virtual printer is a piece of computer software whose user interface and API resemble that of a printer driver, but which is not connected with a physical computer printer.

Printers are designed for low-volume, short-turnaround print jobs; requiring virtually no setup time to achieve a hard copy of a given document. However, printers are generally slow devices (30 pages per minute is considered fast; and many inexpensive consumer printers are far slower than that), and the cost per page is actually relatively high. However this is offset by the on-demand convenience and project management costs being more controllable compared to an out-sourced solution. The printing press naturally remains the machine of choice for high-volume, professional publishing. However, as printers have improved in quality and performance, many jobs which used to be done by professional print shops are now done by users on local printers; see desktop publishing. The world's first computer printer was a 19th century mechanically driven apparatus invented by Charles Babbage for his Difference Engine.

Printers are routinely classified by the underlying print technology they employ; numerous such technologies have been developed over the years. The choice of print engine has a substantial effect on what jobs a printer is suitable for, as different technologies are capable of different levels of image/text quality, print speed, low cost, noise; in addition, some technologies are inappropriate for certain types of physical media (such as carbon paper or transparencies).

Another aspect of printer technology that is often forgotten is resistance to alteration: liquid ink such as from an inkjet head or fabric ribbon becomes absorbed by the paper fibers, so documents printed with a liquid ink sublimation printer are more difficult to alter than documents printed with toner or solid inks, which do not penetrate below the paper surface.

Various Types Of Printers

Liquid inkjet printers

Inkjet printers operate by propelling variably-sized droplets of liquid or molten material (ink) onto almost any sized page. They are the most common type of computer printer for the general consumer.

Solid ink printers

Solid Ink printers, also known as phase-change printers, are a type of thermal transfer printer. They use solid sticks of CMYK Coloured ink (similar in consistency to candle wax), which are melted and fed into a piezo crystal operated print-head. The print head sprays the ink on a rotating, oil coated drum. The paper then passes over the print drum, at which time the image is transferred, or transfixed, to the page.

Solid ink printers are most commonly used as Colour office printers, and are excellent at printing on transparencies and other non-porous media. Solid ink printers can produce excellent results. Acquisition and operating costs are similar to laser printers. Drawbacks of the technology include high power consumption and long warm-up times from a cold state. Also, some users complain that the resulting prints are difficult to write on (the wax tends to repel inks from pens), and are difficult to feed through Automatic Document Feeders, but these traits have been significantly reduced in later models. In addition, this type of printer is only available from one manufacturer, Xerox, manufactured as part of their Xerox Phaser office printer line is also available by various Xerox concessionaires . Previously, solid ink printers were manufactured by Tektronix, but Tek sold the printing business to Xerox in 2001.

Thermal printers work by selectively heating regions of special heat-sensitive paper. Monochrome thermal printers are used in cash registers, ATMs, gasoline dispensers and some older inexpensive fax machines. Colours can be achieved with special papers and different temperatures and heating rates for different Colours. One example is the ZINK technology.

UV printers

Xerox is working on an inkless printer which will use a special reusable paper coated with a few micro meters of UV light sensitive chemicals. The printer will use a special UV light bar which will be able to write and erase the paper. As of early 2007 this technology is still in development and the text on the printed pages can only last between 16–24 hours before fading. The following technologies are either obsolete, or limited to special applications though most were, at one time, in widespread use.

Impact printers rely on a forcible impact to transfer ink to the media, similar to the action of a typewriter. All but the dot matrix printer rely on the use of formed characters, letterforms that represent each of the characters that the printer was capable of printing. In addition, most of these printers were limited to monochrome printing in a single typeface at one time, although bolding and underlining of text could be done by over striking, that is, printing two or more

Impressions in the same character position. Impact printers varieties include, Typewriter-derived printers, Teletypewriter-derived printers, Daisy wheel printers, Dot matrix printers and Line printers. Dot matrix printers remain in common use in businesses where multi-part forms are printed, such as car rental service counters. An overview of impact printing contains a detailed description of many of the technologies used.

The common teleprompter could easily be interfaced to the computer and became very popular except for those computers manufactured by IBM. Some models used a "typebox" that was positioned (in the X- and Y-axes) by a mechanism and the selected letter from was struck by a hammer. Others used a type cylinder in a similar way as the Selectric typewriters used their type ball. In either case, the letter form then struck a ribbon to print the letterform. Most teleprinters operated at ten characters per second although a few achieved 15 CPS. Daisy-wheel printers operate in much the same fashion as a typewriter. A hammer strikes a wheel with petals (the daisy wheel), each petal containing a letter form at its tip. The letter form strikes a ribbon of ink, depositing the ink on the page and thus printing a character. By rotating the daisy wheel, different characters are selected for printing. These printers were also referred to as letter-quality printers because, during their heyday, they could produce text which was as clear and crisp as a typewriter (though they were

nowhere near the quality of printing presses). The fastest letter-quality printers printed at 30 characters per second.

Fig 1.13.: U V Led Hybrid Printer

In the general sense many printers rely on a matrix of pixels, or dots, that together form the larger image. However, the term dot matrix printer is specifically used for impact printers that use a matrix of small pins to create precise dots. The advantage of dot-matrix over other impact printers is that they can produce graphical images in addition to text; however the text is generally of poorer quality than impact printers that use letterforms (type).

Dot-matrix printers can be broadly divided into two major classes: Ballistic wire printers (discussed in the dot matrix printers article) Stored energy printers.

Fig 1.14.: A Tandy 1000 HX With A Tandy DMP-133 Dot-Matrix Printer

Dot matrix printers can either be character-based or line-based (that is, a single horizontal series of pixels across the page), referring to the configuration of the print head.

At one time, dot matrix printers were one of the more common types of printers used for general use — such as for home and small office use. Such printers would have either 9 or 24 pins on the print head. 24-pin print heads were able to print at a higher quality. Once the price of inkjet printers dropped to the point where they were competitive with dot matrix printers, dot matrix printers began to fall out of favor for general use.

Some dot matrix printers, such as the NEC P6300, can be upgraded to print in Colour. This is achieved through the use of a four-Colour ribbon mounted on a mechanism (provided in an upgrade kit that replaces the standard black ribbon mechanism after installation) that raises and lowers the ribbons as needed. Colour graphics are generally printed in four passes at standard resolution, thus slowing down printing considerably. As a result, Colour graphics can take up to four times longer to print than standard monochrome graphics, or up to 8-16 times as long at high resolution mode.

Dot matrix printers are still commonly used in low-cost, low-quality applications like cash registers, or in demanding, very high volume applications like invoice printing. The fact that they use an impact printing method allows them to be used to print multi-part documents using carbonless copy paper (like sales invoices and credit card receipts), whereas other printing methods are unusable with paper of this type. Dot-matrix printers are now (as of 2005) rapidly being superseded even as receipt printers.

Line printers

Line printers, as the name implies, print an entire line of text at a time. Three principal designs existed. In drum printers, a drum carries the entire character set of the printer repeated in each column that is to be printed. In chain printers (also known as train printers), the character set is arranged multiple times around a chain that travels horizontally past the print line. In either case, to print a line, precisely timed hammers strike against the back of the paper at the exact moment that the correct character to be printed is passing in front of the paper. The paper presses forward against a ribbon which then presses against the character form

and the impression of the character form is printed onto the paper. Comb printers represent the third major design. These printers were a hybrid of dot matrix printing and line printing. In these printers, a comb of hammers printed a portion of a row of pixels at one time (for example, every eighth pixel). By shifting the comb back and forth slightly, the entire pixel row could be printed (continuing the example, in just eight cycles). The paper then advanced and the next pixel row was printed. Because far less motion was involved than in a conventional dot matrix printer, these printers were very fast compared to dot matrix printers and were competitive in speed with formed-character line printers while also being able to print dot-matrix graphics.

Line printers were the fastest of all impact printers and were used for bulk printing in large computer centers. They were virtually never used with personal computers and have now been replaced by high-speed laser printers.

Line printers, better known as line matrix printers are widely used in the automotive, logistic and banking world for high speed and barcode printing. They are known as robust and durable printers that have the lowest price per page (form).

Pen-based plotters

A plotter is a vector graphics printing device which operates by moving a pen over the surface of paper. Plotters have been used in applications such as computer-aided design, though they are rarely used now and are being replaced with wide-format conventional printers (which nowadays have sufficient resolution to render high-quality vector graphics using a rasterized print engine). It is commonplace to refer to such wide-format printers as "plotters", even though such usage is technically incorrect.

Monochrome, Color and photo printers

A monochrome printer can only produce an image consisting of one Color, usually black. A monochrome printer may also be able to produce various tones of that Color, such as a grey-scale. A Color printer can produce images of multiple Colors. A photo printer is a Color printer that can produce images that mimic the Color range (gamut) and resolution of photographic methods of printing. Many can be used autonomously (without a computer), with a memory card or USB connector.

Digital Ink Based Printing

Inks are found in almost every aspect of human activity. We read news-papers, magazines, and books on a daily basis. We post lists on our re-frigerators, jot things down on our calendars, and leave sticky notes for our coworkers and friends. We make piles of photocopies and print lots of pages from our computers. We buy myriad packaged consumer prod-ucts printed with ink. We use stamps and money, again printed with ink.

And if you delve into finding out more about ink, you will learn as I did that people use a lot of ink writing about ink—although I calculate that it took only microliters to print the page you are reading. More about that later.

What is ink? I already had a general idea what ink is: It is an organic or inorganic pigment or dye dissolved or suspended in a solvent—essen-tially the same as paint. I confirmed that fact after digging around a bit, and then learned a whole lot more.

I found out that the first inks were fruit or vegetable juices; protective secretions from cephalopods such as squid, cuttlefish, and octopus; blood from some types of shellfish; and tannin from galls, nuts, or bark from trees. The first man-made ink appeared in Egypt about 4,500 years ago and was made from animal or vegetable charcoal (lampblack) mixed with glue.

Today's inks are divided into two classes: printing inks and writing inks. Printing inks are further broken down into two subclasses: ink for con-ventional printing, in which a mechanical plate comes in contact with or transfers an image to the paper or object being printed on; and ink for digital nonimpact printing, which includes ink-jet and electro photo-graphic technologies.

Color printing inks are made primarily with linseed oil, soybean oil, or a heavy petroleum distillate as the solvent (called the vehicle) combined with organic pigments. The pigments are made up of salts of multiring nitrogen- containing compounds (dyes), such as yellow lake, peacock blue, phthalocyanine green, and diarylide orange. Inorganic pigments also are used in printing inks to a lesser extent. Some examples are chrome green (Cr_2O_3), Prussian blue ($Fe_4[Fe(CN)_6]_3$), cadmium yellow (CdS), and molybdate orange (a mix of lead chromate, molybdate, and sulfate).

Black ink is made using carbon black. And white pigments, such as tita-

nium dioxide, are used either by themselves or to adjust characteristics of color inks. Inks also contain additives such as waxes, lubricants, surfactants, and drying agents to aid printing and to impart any desired special characteristics.

Printing ink is a $10 billion global industry. The Census Bureau tracks about 250 printing ink companies in the U.S., which in 1997 produced 2.2 billion lb of ink with sales of $4 billion. Older style writing inks, such as in fountain pens, use a fluid water-based dye system. But in the 1950s, when ballpoint pens became fashionable, the writing ink industry shifted to paste like oil-based dye systems. The thick consistency allows capillary action to keep the ink flowing well, and the inks generally are no smearing and quicker drying than water-based systems.

Dyes tend to be preferred over pigments for writing inks because pigments can't be dispersed minutely enough and tend to clog the pen tip. And water-based dye or pigment systems are still used for markers, highlighters, and roller ball pens. A few pen manufacturers, such as Bic (which sells about 3 million pens per day), make their own ink, but most pen manufacturers buy their ink.

That sums up the gobs of information I found on inks. But I still had one burning question: How come ink from the daily paper sometimes smudges off onto your fingers? I called the Washington Post to find out. Inks dry by different processes, explained Hugh J. Price, the paper's director of production planning. Linseed oil inks dry by air oxidation, which solidifies the vehicle. The Inks with alcohol- or petroleum-based solvents dry by evaporation, usually assisted by heating the paper.

Newspapers are generally printed with a mineral oil ink at a very fast rate— several thousand feet per minute. Because newsprint is not heated, that allows little time for the ink to air-dry, Price noted. Instead, the ink is absorbed by the inner fibers of the sheet of paper and remains there a bit damp during most of the transient life of the paper—the vehicle doesn't completely evaporate.

So when you handle the paper some of the ink can rub off onto your fingers. The amount depends on how fresh the newspaper is. Ink on the pages of books, magazines, newspaper inserts, and catalogs doesn't smudge off, Price added, because they are usually completely dried during the print run and are printed on a different type of paper.

The four colors of ink used—black, cyan, magenta, and yellow—are pumped into different units of a press. The ink sits in a "fountain" where it is picked up and transferred via the etched printing plate to the paper.

So what does the future hold for ink? Could ink someday become passé? The advent of personal computers, personal electronics, and the Internet may one day replace libraries full of printed books and periodicals with electronic products. For example, electrophoretic inks that currently are being commercialized can be corrected, edited, or updated if needed by momentarily applying an electric field. And electronic books (e-books) with digital displays, something similar to a palmtop computer, may be in vogue in a few years. But the great paperless society hasn't begun to show itself yet—people simply like paper too much. And as long as there's paper, then there must be ink.

Ink Jet Being The Most Common Of All

An inkjet printer is a type of computer printer that reproduces a digital image by propelling variably-sized droplets of liquid material (ink) onto a page. Inkjet printers are the most common type of printer and range from small inexpensive consumer models to very large and expensive professional machines.

The concept of inkjet printing dates back to the 19th century and the technology was first developed in the early 1950s. Starting in the late 1970s inkjet printers that could reproduce digital images generated by computers were developed, mainly by Epson, Hewlett-Packard and Canon. In the worldwide consumer market, four manufacturers account for the majority of inkjet printer sales: Canon, Hewlett-Packard, Epson, and Lexmark[citation needed].

The emerging ink jet material deposition market also uses ink jet technologies, typically piezoelectric crystals, to deposit materials directly on substrates.

The basic problem with inkjet inks are the conflicting requirements for a coloring agent that will stay on the surface and rapid dispersement of the carrier fluid.

Desktop inkjet printers, as used in offices or at home, tend to use aqueous inks based on a mixture of water, glycol and dyes or pigments. These inks are inexpensive to manufacture, but are difficult to control on the surface of media, often requiring specially coated media. HP inks con-

tain sulfonated polyazo black dye (commonly used for dying leather), nitrates and other compounds. Aqueous inks are mainly used in printers with thermal inkjet heads, as these heads require water in order to perform.

While aqueous inks often provide the broadest color gamut and most vivid color, most are not waterproof without specialized coating or lamination after printing. Most Dye-based inks, while usually the least expensive, are subject to rapid fading when exposed to light. Pigment-based aqueous inks are typically more costly but provide much better long-term durability and ultraviolet resistance. Inks marketed as "Archival Quality" are usually pigment-based.

Inkjet advantages

Compared to earlier consumer-oriented color printers, inkjets have a number of advantages. They are quieter in operation than impact dot matrix or daisywheel printers. They can print finer, smoother details through higher print head resolution, and many consumer inkjets with photographic-quality printing are widely available.

In comparison to more expensive technologies like thermal wax, dye sublimations, and laser printers, inkjets have the advantage of practically no warm up time and lower cost per page (except when compared to laser printers).

For some inkjet printers, monochrome ink sets are available either from the printer manufacturer or third-party suppliers. These allow the inkjet printer to compete with the silver-based photographic papers traditionally used in black- and-white photography, and provide the same range of tones – neutral, "warm" or "cold". When switching between full-color and monochrome ink sets, it is necessary to flush out the old ink from the print head with a cleaning cartridge.

Fig 1.15.: An Epson Inkjet Printer

Professional inkjet printers

Besides the well known small inkjet printers for home and office, there is a market for professional inkjet printers, some being for "page-width" format printing, but most being for wide format printing. Page-width format means that the print width ranges from about 8.5" to 37" (about 20 cm to 100 cm). "Wide format" means that these are printers ranging in print width from 24" up to 15' (about 75 cm to 5 m). The application of the page-width printers is for printing high-volume business communications that have a lesser need for flashy layout and color. Particularly with the addition of variable data technologies, the page- width printers are important in billing, tagging, and individualized catalogs and newspapers. The application of most of the wide format printers is for printing advertising graphics; a minor application is printing of designs by architects or engineers.

Another specialty application for inkjets is producing prepress color proofs for printing jobs created digitally. Such printers are designed to give accurate color rendition of how the final image will look (a "proof") when the job is finally

produced on a large volume press such as a four-colour offset lithography press. A well-known example of an inkjet designed for proof work is an Iris printer, and outputs from them are commonly "iris proofs" or just "irises".

Inkjet printers may have a number of disadvantages:

The ink is often very expensive. (For a typical OEM cartridge priced at $15, containing 5 mL of ink, the ink effectively costs $3000 per liter— or $8000 per gallon.) According to the BBC (2003), "The cost of ink has been the subject of an Office of Fair Trading investigation. Which? magazine has accused manufacturers of a lack of transparency about the price of ink and called for an industry standard for measuring ink cartridge performance"

Many "intelligent" ink cartridges contain a microchip that communicates the estimated ink level to the printer; this may cause the printer to display an error message, or incorrectly inform the user that the ink cartridge is empty. In some cases, these messages can be ignored, but some inkjet printers will refuse to print with a cartridge that declares itself empty, in order to prevent consumers from refilling cartridges. Thus, Epson embeds a chip which prevents from printing when the chip claims the cartridge is empty, although a researcher who over-rode the system found that in one case he could print up to 38% more good quality pages, even though the chip stated that the cartridge was empty.

The lifetime of inkjet prints produced by inkjets using aqueous inks is limited; they will eventually fade and the color balance may change. On the other hand, prints produced from solvent-based inkjets may last several years before fading, even in direct sunlight, and so-called "archival inks" have been produced for use in aqueous-based machines which offer extended life.

Because the ink used in most consumer inkjets is water-soluble, care must be taken with inkjet-printed documents to avoid even the smallest drop of water, which can cause severe "blurring" or "running." Similarly, water-based highlighter markers can blur inkjet-printed documents.

The very narrow inkjet nozzles are prone to clogging with dried ink. The ink consumed cleaning them - either during cleaning invoked by the user, or in many cases, performed automatically by the printer on a routine schedule - can account for a significant proportion of the total ink installed in the machine.

Overall expense

Inkjet printers cost less than laser printers, but their more expensive ink cartridges means that the ink cost per page is higher. As a result, inkjet

printers tend to be more economical in low-volume printing Applications, while laser printers tend to be more economical for medium- to high-volume applications.

Inkjet printers are usually preferred in the home or for applications that require photo-realistic reproduction. Laser Printers are Usually preferred in an office environment with higher printing volume.

Fig 1.16.: Wireless Inkjet

Solid ink

Solid ink is a technology used in computer printers and multifunction devices originally created by Tektronix in 1986. After Xerox acquired the Tektronix Color Printing and Imaging Division in 2000, the solid ink technology became part of the Xerox line of office printing and imaging products. Early offerings focused on the graphic arts industry. The Phaser III product introduced in 1991 cost $10,000 US. As the technology improved and costs were reduced, the focus shifted to office printing environments where quality and cost efficiency are important.

Solid ink technology utilizes solid ink sticks in lieu of the fluid ink or toner powder usually used in printers. After the ink stick is loaded into the printing device, it is melted and used to produce images on paper in a process similar to offset printing. Xerox claims that solid ink printing produces more vibrant colors than other methods, is easier to use, can print on a wide range of media, and is more environmentally friendly due to reduced waste output. The sticks are non-toxic and safe to handle. In the mid 1990s, the president of Tektronix actually ate part of a stick of

solid ink, demonstrating that they are safe to handle and presumably, eat. The medium of the ink was (at least at the time) made from food-grade processed vegetable oils.

Print Quality

Due to the way solid ink printers put the ink onto the page, print quality is considered to be excellent with lively colors. Excellent results can be achieved with low-quality stock, as the wax covers the stock with a glossy surface.

First print time

When warmed up, solid ink printers have one of the fastest first page out time of any printing technology.

Ease of Use

Xerox intentionally produces solid ink blocks in different shapes, in part to

Notes prevent insertion of the wrong color into the wrong supply slot. Some of the issues that existed a few generations ago have disappeared (for instance: abrasion resistance of the image on the finished page)

Waste

Because solid blocks of ink are used, there is less waste generated than is with laser printers or inkjet printers, which produce empty ink or toner cartridges, in addition to packaging and packing materials. A loose ink block does not leave any residual cartridge after it is consumed - only a crushable, thin, plastic packing tray and a recyclable cardboard packaging box.

Ozone

Solid ink printers do not produce ozone, making them more friendly to the environment and better for office workers than laser technology.

Recycled Paper

Solid ink printers are able to print on many different types and thicknesses of media. They are much less sensitive to changes in media type than are color laser printers.

Summary

· Printing ink is a $10 billion global industry.

· Today's inks are divided into two classes: printing inks and writing

inks. Printing inks are further broken down into two subclasses: ink for conventional printing, in which a mechanical plate comes in contact with or transfers an image to the paper or object being printed on; and ink for digital nonimpact printing, which includes ink-jet and electro photographic technologies.

- The CMYK and RGB formats produce only a selective gamut of the full spectrum of colors. The gamut range of each, however, differs.

- A printing press is a mechanical device for applying pressure to an inked surface resting upon a print medium (such as paper or cloth), thereby transferring an image, typically a text.

- Printing processes such as offset lithography use printing plates to transfer an image to paper or other substrates. The plates may be made of metal, plastic, rubber, paper, and other materials.

PRINTING METHODS

❖ **Learning Objectives:**

· Here you will learn the Preface latest printing methods used in visual communication and graphics print media industry.

: Structure :

● Introduction

● Printing Methods

Introduction

Digital printing is the reproduction of digital images on physical surface, such as common or photographic paper, film cloth, plastic, etc. It can be differentiated from Litho printing in many ways, some of which are; Every impression made onto the paper can be different, as opposed to making several hundred or thousand impressions of the same thing from one set of plates, as in traditional methods.

Printing Methods

DIGITAL PRINTING

The Ink or Toner does not absorb into the paper, as does conventional Ink, but forms a layer on the surface. It generally requires less waste in terms of chemicals used and paper wasted in set up. It is excellent for rapid prototyping, or small print runs which means designers. that it is more accessible to a wider range of

Fig 2.1.: Digital Printer

OFFSET PRINTING

Offset printing is a widely used printing technique where the inked image is transferred (or "offset") from a plate to a rubber blanket, then to the printing surface. When used in combination with the lithographic process, which is based on the repulsion of oil and water, the offset technique employs a flat (planographic) image carrier on which the image to be printed obtains ink from ink rollers, while the non-printing area attracts a film of water, keeping the non- printing areas ink-free.
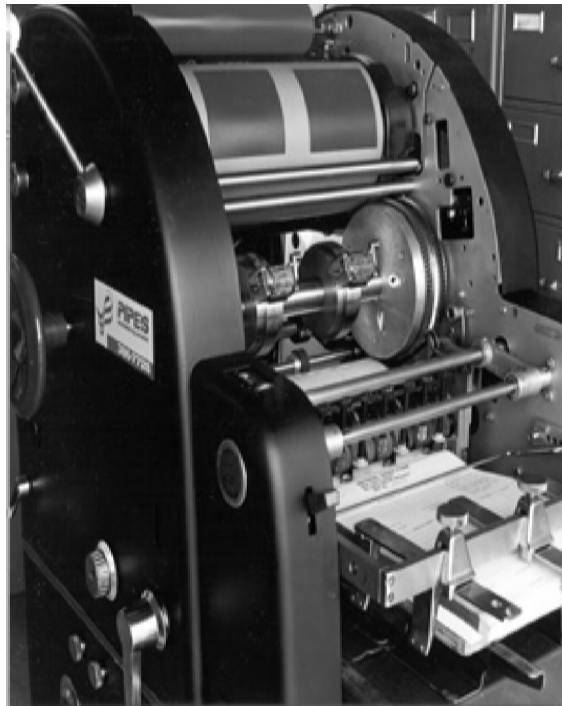
Fig 2.2.: Offset L thography

ADVANTAGES OF OFFSET PRINTING

Advantages of offset printing compared to other printing methods include: Consistent high image quality. Offset printing produces sharper and cleaner images and type than letterpress printing because the rubber blanket conforms to the texture of the printing surface. Quick and easy production of printing plates.

Longer printing plate life than on direct litho presses because there is no direct contact between the plate and the printing surface.

In the last two decades flexography has become the dominant form of printing in packaging due to lower quality expectations and the significantly lower costs in comparison to other forms of printing.

SCREEN PRINTING

Screen printing is the process of using ink and mesh to create images. A

squeegee is used to force the ink through a mesh screen and onto the printable item. The ink is then cured (dried) creating a permanent image

This process has been used in various forms since 2500 BC. With today's advancements, screen printing has grown into an industry employing hundreds of thousands of people all over the world.

The Screen-A-Print is a professional quality printing system. It will print images on any flat surface. This includes t-shirts, tote bags, posters, stickers, umbrellas, jackets, hats/caps (with use of a hat platen) and much more. You can also print on fabric, wood, and nylon, plastic and metal.

What is one or two color printing?

One color printing frequently uses the standard black ink on white paper, but varying the ink is an option and can create a different and eye catching look. Another option would be to vary ink color and paper color to create an even more dramatic look.

Two color printing commonly uses black and one other color to create a more drastic feel to the brochure. There is also the option of using different inks, and paper color to give your document higher impact on the reader.

Books and newspapers are printed today using the technique of offset lithography. Other common techniques include:

Flexography used for packaging, labels, newspapers Relief print, (mainly used for catalogues),

Screen printing from T-shirts to floor tiles

Rotogravure mainly used for magazines and packaging,

Inkjet used typically to print a small number of books or packaging, and also to print a variety of materials from high quality papers simulate offset printing, to floor tiles; Inkjet is also used to apply mailing addresses to direct mail pieces

Hot wax dye transfer

Laser printing mainly used in offices and for transactional printing (bills, bank documents). Laser printing is commonly used by direct mail companies to create variable data letters or coupons, for example.

Pad printing for applying a flat image on a curved substrate.

OFFSET LITHOGRAPHY

Offset printing is a commonly used printing technique where the inked image is transferred (or "offset") from a plate to a rubber blanket, then to the printing surface. When used in combination with the lithographic process, which is based on the repulsion of oil and water, the offset technique employs a flat (planographic) image carrier on which the image to be printed obtains ink from ink rollers, while the non-printing area attracts a water-based film (called "fountain solution"), keeping the non-printing areas ink-free.

Lithography was initially created to be a low cost method of reproducing artwork. This printing process was limited to use on flat, porous surfaces because the printing plates were produced from limestone. Tin cans were popular packaging materials in the 1800s, but transfer technologies were required before the lithographic process could be used to print on the tin.

The first rotary offset lithographic printing press was created in England and patented in 1875 by Robert Barclay. This development combined mid-1800s transfer printing technologies and Richard March Hoe's 1843 rotary printing press—a press that used a metal cylinder instead of a flat stone. The offset cylinder was covered with specially treated cardboard that transferred the printed image from the stone to the surface of the metal. Later, the cardboard covering of the offset cylinder was changed to rubber, which is still the most commonly used material.

Ink Jet

An inkjet printer is a type of computer printer that reproduces a digital image by propelling variably-sized droplets of liquid material (ink) onto a page. Inkjet printers are the most common type of printer and range from small inexpensive consumer models to very large and expensive professional machines.

The concept of inkjet printing dates back to the 19th century and the technology was first developed in the early 1950s. Starting in the late 1970s inkjet printers that could reproduce digital images generated by computers were developed, mainly by Epson, Hewlett-Packard and Canon. In the worldwide consumer market, four manufacturers account for the majority of inkjet printer sales: Canon, Hewlett-Packard, Epson, and Lexmark.

The emerging ink jet material deposition market also uses ink jet technologies, typically piezoelectric crystals, to deposit materials directly on substrates.

LASER PRINTER

A laser printer is a common type of computer printer that rapidly produces high quality text and graphics on plain paper. As with digital photocopiers and multifunction printers (MFPs), laser printers employ a xerographic printing process but differ from analog photocopiers in that the image is produced by the direct scanning of a laser beam across the printer's photoreceptor.

A laser beam projects an image of the page to be printed onto an electrically charged rotating drum coated with selenium. Photoconductivity removes charge from the areas exposed to light. Dry ink (toner) particles are then electro statically picked up by the drum's charged areas. The drum then prints the image onto paper by direct contact and heat, which fuses the ink to the paper.

Laser printers have many significant advantages over other types of printers. Unlike impact printers, laser printer speed can vary widely, and depends on many factors, including the graphic intensity of the job being processed. The fastest models can print over 200 monochrome pages per minute (12,000 pages per hour). The fastest colour laser printers can print over 100 pages per minute (6000 pages per hour). Very high-speed laser printers are used for mass mailings of personalized documents, such as credit card or utility bills, and are competing with lithography in some commercial applications.

Fig 2.3.: Laser printer

Fig 2.4.: Laser printer

The cost of this technology depends on a combination of factors, including the cost of paper, toner, and infrequent drum replacement, as well as the replacement of other consumables such as the fuser assembly and transfer assembly. Often printers with soft plastic drums can have a very high cost of ownership that does not become apparent until the drum requires replacement.

The laser printer was invented at Xerox in 1969 by researcher Gary Starkweather, who had an improved printer working by 1971 and incorporated into a fully functional networked printer system by about a year later. The prototype was built by modifying an existing xerographic copier. Starkweather disabled the imaging system and created a spinning drum with 8 mirrored sides, with a laser focused on the drum. Light from the laser would bounce off the spinning drum, sweeping across the page as it traveled through the copier. The hardware was completed in just a week or two, but the computer interface and software took almost 3 months to complete.

FLEXOGRAPHY

Flexography (often abbreviated to flexo) is a form of printing process which utilizes a flexible relief plate. It is basically an updated version of letterpress that can be used for printing on almost any type of substrate including plastic, metallic films, cellophane, and paper. It is widely used for printing on the non-porous substrates required for various types of food packaging (it is also well suited for printing large areas of solid color).

Originally, flexographic printing was rudimentary in quality. Labels requiring high quality have generally been printed using the offset process until recently. Since 1990[2] great advances have been made to the quality of flexographic printing presses, printing plates and printing inks. The greatest advances in flexographic printing have been in the area of photopolymer printing plates, including improvements to the plate material and the method of plate creation.

Digital direct to plate systems have been a good improvement in the industry recently. Companies like DuPont, MacDiarmid, Kodak and Esko have Pioneered the latest technologies, with advances in fast washout and the latest screening technology.

Laser-etched ceramic anilox rolls also play a part in the improvement of print quality. Full color picture printing is now possible, and some of the finer presses available today, in combination with a skilled operator, allow quality that rivals the lithographic process. One ongoing improvement has been the increasing ability to reproduce highlight tonal values, thereby providing a workaround for the very high dot gain associated with flexographic printing.

Plate making

The first method of plate development uses light-sensitive polymer. A film negative is placed over the plate, which is exposed to ultra-violet light. The polymer hardens where light passes through the film. The remaining polymer has the consistency of chewed gum. It is washed away in a tank of either water or solvent. Brushes scrub the plate to facilitate the "washout" process. The process can differ depending on whether solid sheets of photopolymer or liquid photopolymer are used, but the principle is still the same. The second method used a computer-guided laser to etch the image onto the printing plate. Such a direct laser engraving process is called digital plate making. The third method is to go through a molding process. The first step is to create a metal plate out of the negative of our initial image through an exposition process (followed by an acid bath). This metal plate in relief is then used in the second step to create the mold that could be in Bakelite board or even glass or plastic, through a first molding process. Once cooled, this master mold will press the rubber or plastic compound (under both controlled temperature and pressure) through a second molding process to create the printing plate.

Printing

A flexographic print is made by creating a positive mirrored master of the required image as a 3D relief in a rubber or polymer material. Flexographic plates can be created with analog and digital plate making processes. The image areas are raised above the non image areas on the rubber or polymer plate. The ink is transferred from the ink roll which is partially immerged in the ink tank. Then it transfers to the anilox roll (or meter roll) whose texture holds a specific amount of ink since it's covered with thousands of small wells or cups that enable it to meter ink to the printing plate in a uniform thickness evenly and quickly (the number of cells per linear inch can vary according to the type of print job and the quality required). To avoid getting a final product with a smudgy or lumpy look, it must be ensured that the amount of ink on the printing plate is not excessive. This is achieved by using a scraper, called a doctor blade. The doctor blade removes excess ink from the anilox roller before inking the printing plate. The substrate is finally sandwiched between the plate and the impression cylinder to transfer the image.

Flexographic printing inks

The nature and demands of the printing process and the application of the printed product determine the fundamental properties required of flexographic inks. Measuring the physical properties of inks and understanding how these are affected by the choice of ingredients is a large part of ink technology. Formulation of inks requires a detailed knowledge of the physical and chemical properties of the raw materials composing the inks, and how these ingredients affect or react with each other as well as with the environment. Flexographic printing inks are primarily formulated to remain compatible with the wide variety of substrates used in the process. Each formulation component individually fulfills a special function and the proportion and composition will vary according to the substrate.

There are five types of inks that can be used in flexography: Solvent-based Inks, Water-based Inks, EB (Electron Beam) curing inks, UV(ultraviolet) Curing Inks and two part chemically curing inks (usually based on polyurethane isocyanate reactions), although these are uncommon at the moment.

Ink control

The ink is controlled in the flexographic printing process by the inking unit. The inking unit can be either of Fountain Roll system or Doctor Blade System. The Fountain roll system is a simple old system yet if there is too much or too little ink this system would likely not control in a good way. The doctor blade inside the Anilox roller uses cell geometry and distribution. These blades insure that the cells are filled with enough ink.

Applications

Flexo has an advantage over lithography in that it can use a wider range of inks, water based rather than oil based inks, and is good at printing on a variety of different materials like plastic, foil, acetate film, brown paper, and other materials used in packaging. Typical products printed using flexography include brown corrugated boxes, flexible packaging including retail and shopping bags, food and hygiene bags and sacks, milk and beverage cartons, flexible plastics, self adhesive labels, disposable cups and containers, envelopes and wallpaper. A number of newspapers now eschew the more common offset lithography process in favour of flexo. Flexographic inks, like those used in gravure and unlike those used in lithography, generally have a low viscosity. This enables faster drying and, as a result, faster production, which results in lower costs.
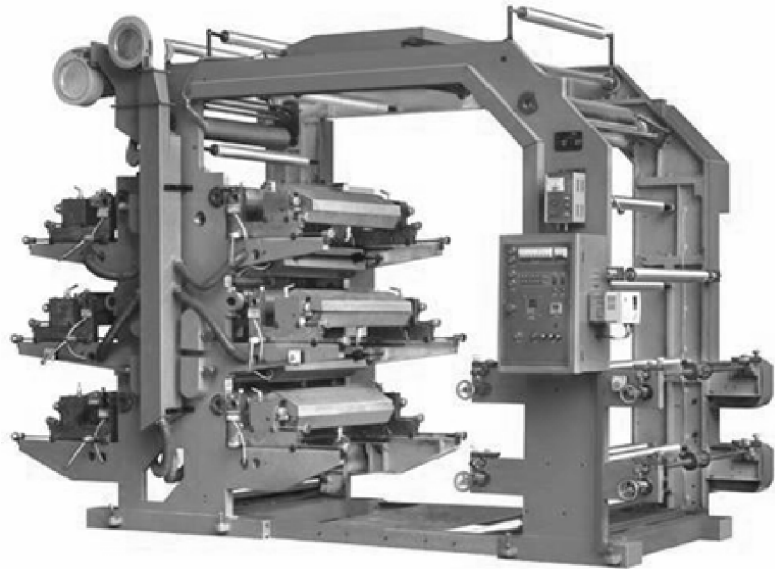

Fig 2.5.: Flexography

Fig 2.6.: Flexography Machine

Gravure Printing

Rotogravure (Roto or gravure for short) is a Type of intaglio printing process, that is, it involves engraving the image onto an image carrier. In gravure printing, the image is engraved onto a copper cylinder because, like offset and flexography, it uses a rotary printing press. The vast majority of gravure presses print on rolls (also known as webs) of paper, rather than sheets of paper. (Sheetfed gravure is a small, specialty market.) Rotary gravure presses are the fastest and widest presses in operation, printing everything from narrow labels to 12 feet (4 m)-wide rolls of vinyl flooring. Additional operations may be in-line with a gravure press, such as saddle stitching facilities for Magazine/brochure work. Once a staple of newspaper photo features, the rotogravure process is still used for commercial printing of magazines, postcards, and corrugated (cardboard) product packaging.

A rotogravure printing press has one printing unit for each color, typically CMYK or cyan, magenta, yellow and key (printing terminology for black). The number of units varies depending on what colors are required to produce the final image. There are five basic components in each color unit: an engraved cylinder (whose circumference can change according to the layout of the job), an ink fountain, a doctor blade, an impression roller, and a dryer. While the press is in operation, the engraved cylinder is partially immersed in the ink fountain, filling the recessed cells. As the cylinder rotates, it draws ink out of the fountain with it.

Acting as a squeegee, the doctor blade scrapes the cylinder before it

makes contact with the paper, removing ink from the non-printing (non-recessed) areas. Next, the paper gets sandwiched between the impression roller and the gravure cylinder. This is where the ink gets transferred from the recessed cells to the paper. The purpose of the impression roller is to apply force, pressing the paper onto the gravure cylinder, ensuring even and maximum coverage of the ink. Then the paper goes through a dryer because it must be completely dry before going through the next color unit and absorbing another coat of ink.

Because gravure is capable of transferring more ink to the paper than other printing processes, gravure is noted for its remarkable density range (light to shadow) and hence is a process of choice for fine art and photography reproduction, though not typically as clean an image as that of sheet fed litho or web offset litho. Gravure is widely used for long-run magazine printing in excess of 1 million copies. Gravure's major quality shortcoming is that all images, including type and "solids," are actually printed as dots, and the screen pattern of these dots is readily visible to the naked eye. Examples of gravure work in the United States are typically long-run magazines, mail order catalogs, consumer packaging, and Sunday newspaper ad inserts.

Summary

·   The Ink or Toner does not absorb into the paper, as does conventional Ink, but forms a layer on the surface

·   Offset printing is a widely used printing technique where the inked image is transferred (or "offset") from a plate to a rubber blanket, then to the printing surface.

·   In the last two decades flexography has become the dominant form of printing in packaging due to lower quality expectations and the significantly lower costs in comparison to other forms of printing.

·   Screen printing is the process of using ink and mesh to create images. A squeegee is used to force the ink through a mesh screen and onto the printable item.

·   One color printing frequently uses the standard black ink on white paper, but varying the ink is an option and can create a different and eye catching look.