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Introduction to Printing Technologies

Study Material for Students



: Introduction to Printing Technologies

CAREER OPPORTUNITIES IN MEDIA WORLD

Mass communication and Journalism is institutionalized and source specific. It functions through well-organized professionals and has an ever increasing interlace. Mass media has a global availability and it has converted the whole world in to a global village. A qualified journalism professional can take up a job of educating, entertaining, informing, persuading, interpreting, and guiding. Working in print media offers the opportunities to be a news reporter, news presenter, an editor, a feature writer, a photojournalist, etc. Electronic media offers great opportunities of being a news reporter, news editor, newsreader, programme host, interviewer, cameraman, producer, director, etc.

Other titles of Mass Communication and Journalism professionals are script writer, production assistant, technical director, floor manager, lighting director, scenic director, coordinator, creative director, advertiser, media planner, media consultant, public relation officer, counselor, front office executive, event manager and others.



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INTRODUCTION

The book introduces the students to fundamentals of printing. Today printing technology is a part of our everyday life. It is all around us. The history and origin of printing technology are also discussed in the book. Students of mass communication will also learn about the different types of printing and typography in this book. The book will also make a comparison between Traditional Printing Vs Modern Typography.



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Introduction to Printing Technologies

SYLLABUS

Introduction to Printing Technologies

Printing;
It's meaning,
History,
Origin,



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Types of Printing Process,
Elements of Printing,
Paper,
Comparison between Printing Process,
Traditional Printing Vs Modern Typography,
Type size,
Type Style,
Colors.

INTRODUCTION TO PRINTING TECHNOLOGIES

OBJECTIVES

- to learn about the origin of printing and its history
- to know the latest printing technologies
- to learn different stages in the process of printing

1.1. PRINTING

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Printing is a process for production of texts and images, 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. **The art and science of making a large number of duplicate reproductions of an original copy is termed as printing.** It may be defined as the art of preserving all other arts. Printing is the medium for printed communication.



1.2. ITS MEANING

For every newspaper, book, or other printed product, there is a production crew laboring behind the scenes, from printing press operators to bindery workers. As a printing technology major, you'll learn the skills necessary to plan, prepare, and complete print jobs, from assembling film to operating printing equipment to cutting and collating the finished product. This is the age of hi-fi, jets and computers. Rapid advancements in science and technology have made their impact on the printing industry of the world too. The old techniques of printing have become obsolete and made way for the new technology. The book contains the latest printing processes like

web, gravure, flexo, security and offset printing.

1.3. HISTORY OF PRINTING

Four Important Periods in the History of the Book

- I. 7th to 13th Century: The age of religious "manuscript" book production. Books in this period are entirely constructed by hand, and are largely religious texts whose creation is meant as an act of worship.
- II. 13th to 15th Century: The secularization of book production. Books are beginning to be produced that do not serve as objects of worship, but that try



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to explain something about the observable world. The difficulty with the spread of such knowledge is that production is still taking place via pre-print - manuscript - methods.

The production of secular books is driven by two things:

- The rise of universities in Europe, spreading from Italy.
- The return of the crusaders in the 13th century, who bring with them texts from Byzantium. These books, written during the Greek and Roman periods in history, focus on this-world concerns.

III. 15th to 16th Century: The first printed books. These are print versions of traditional works like the Bible, books of hours prayer books and the religious calendars.

IV. 16th to 17th Century: New information is put into books that have important consequences for European life and society.

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Book making before the age of the Print- you can see text being dictated, hand written and illustrated.

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Block printing in China



Printing is one of the four great inventions of Ancient China. This technology made an extreme contribution to books and records production. It speeds up the documentation of human history. However, many of the records had been worn out under dictatorship, wars and disasters.

Woodblock printing on paper, whereby individual sheets were pressed against wooden blocks with the text and illustrations carved into them, was first recorded in China in the Tang Dynasty, although as a method for printing patterns on cloth the earliest surviving examples from China date to before 220, and from Egypt to the 6th or 7th centuries.

In China the technique of printing with carved wood blocks appeared about the 7th century, early in the Tang dynasty. Block printing reached its golden age during the Song dynasty, 960 - 1279AD, as the Emperors encouraged the publication of large numbers of books by the central and local governments. Movable type was first invented in 1045 AD by Bi Sheng of the Song dynasty. The invention of reusable, moveable type made books cheaper and more readily available. Europeans invented movable type some 400 years later.

In a memorial to the throne in 1023, Northern Song Dynasty China, it recorded that the central government at that time used copperplate to print the paper money also the copper-block to print the numbers and characters on the money, nowadays we

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can find these shadows from the Song paper money. Later in the Jin Dynasty, people used the same but more developed technique to print paper money and formal official documents; the typical example of this kind of movable copper-block printing is a printed "check" of Jin Dynasty in the year of 1215.

Block Printing in Europe

Block printing came to Christian Europe as a method for printing on cloth, where it was common by 1300. Images printed on cloth for religious purposes could be quite large and elaborate, and when paper became relatively easily available, around 1400, the medium transferred very quickly to small woodcut religious images and playing cards printed on paper. These prints were produced in very large numbers from about 1425 onwards.

History of Printing in East Asia

Movable type printing was first invented in 1041 by Bi Sheng in China. Sheng used clay type, which broke easily, but Wang Zhen later carved a more durable type from wood.

Movable type, though known in China, was not extensively used there until the European-style printing press was introduced in relatively recent times.

East Asian printing technology may possibly have diffused into Europe through the trade routes from China through India or the Arabic world, although there is no evidence. The lack of known intermediaries and profound technical differences in detail indicate that Gutenberg's invention of movable type was done independently.



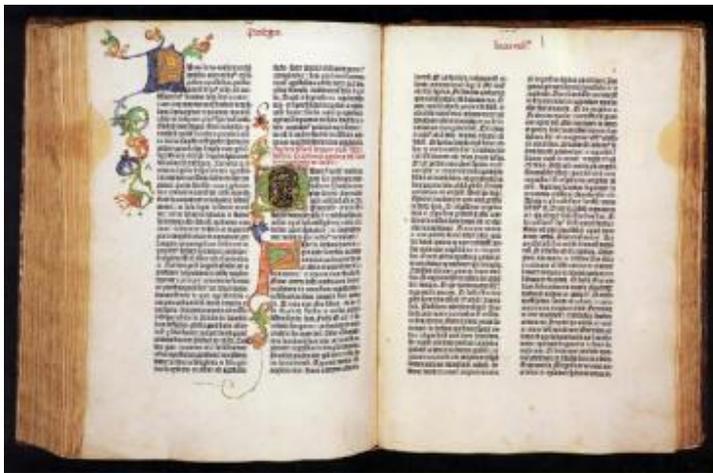
In Europe

Johann Gutenberg, of the German city of Mainz, developed European printing technology in 1440, with which the classical age of printing began. Also, Johann Fust and Peter Schöffer experimented with him in Mainz. Genealogically, all modern movable type printing can be traced back to a single source, Gutenberg's printing press which he

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derived from the design of long known agricultural presses. East Asian style movable type printing, which was based on laborious manual rubbing and which had been scarcely used, practically died out after the introduction of European style printing in the 19th century.

Gutenberg is also credited with the introduction of an oil-based ink which was more durable than previously used water-based inks. Having worked as a professional goldsmith, Gutenberg made skillful use of the knowledge of metals he had learned as a craftsman. Gutenberg was also the first to make his type from an alloy of lead, tin, and antimony. It proved to be producing durable type for production of quality printed books, and proved to be more suitable for printing than the clay, wooden or bronze types used in East Asia.



The Gutenberg Bible was the first book printed.



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To create these lead types, Gutenberg used what some considered his most ingenious invention, a special matrix wherewith the moulding of new movable types with an unprecedented precision at short notice became feasible. Within a year after this, Gutenberg also published the first coloured prints. Gutenberg's invention of the printing press revolutionized communication and book production leading to the spread of knowledge. Rapidly, printing spread from Germany by emigrating German printers, but also by foreign apprentices returning home. A printing press was built in Venice in 1469, and by 1500 the city had 417 printers.

Gutenberg was trying to invent a method of printing. He didn't have very much money left, but he would not give up. He continued to work on the great project. While he was teenager working at his town's mint; the place where money was made, he got the idea for creating books by machine. Up until this time all the books had to be copied by hand. It was very slow, and it took a long, long time to make one book.

After the book was written, they would take a metal punch and spell out the letters for the title on the front of the leather cover. Maybe this gave Gutenberg the idea for metal letters to write the words on the pages of the book. His work at the mint helped him in making the metal letters for printing. The letters had to be the same height to look right.

Also at the mint he worked with a stamp press used to make government seals. He used this knowledge to help him make a printing press. It is believed that the first item ever printed on the printing press was a German poem. Before the printing of the Bible he established good business printing school books of Latin grammar. It is assumed he had two workshops, one for printing the Bible and another for all other print jobs.

When he needed money he went to John Fust, a moneylender. He got the money to buy the material to make 46,000 pieces of movable type. He also hired 16 workers. He was able to print the first Bible, the Gutenberg Bible. Then Fust, his moneylender accused Gutenberg of stealing some of the money. They went to court and Fust won. Gutenberg had to turn over the Bible printing workshop and half of all the printed Bibles. Fust also took Gutenberg's co-worker with him. All this was quite a blow to him. Some of the first copies still exist today. They are among the world's greatest treasures. The method he invented for printing remained unchanged for many years. In his later life he was honored with the title of Hofmann which means "gentleman of the court". He was given a small pension and some yearly grain and wine. He died a highly respected person.

In 1470 Johann Heynlin set up a printing press in Paris. Stephen Day was the first to build a printing press in North America at Massachusetts Bay in 1628, and helped establish the Cambridge Press.



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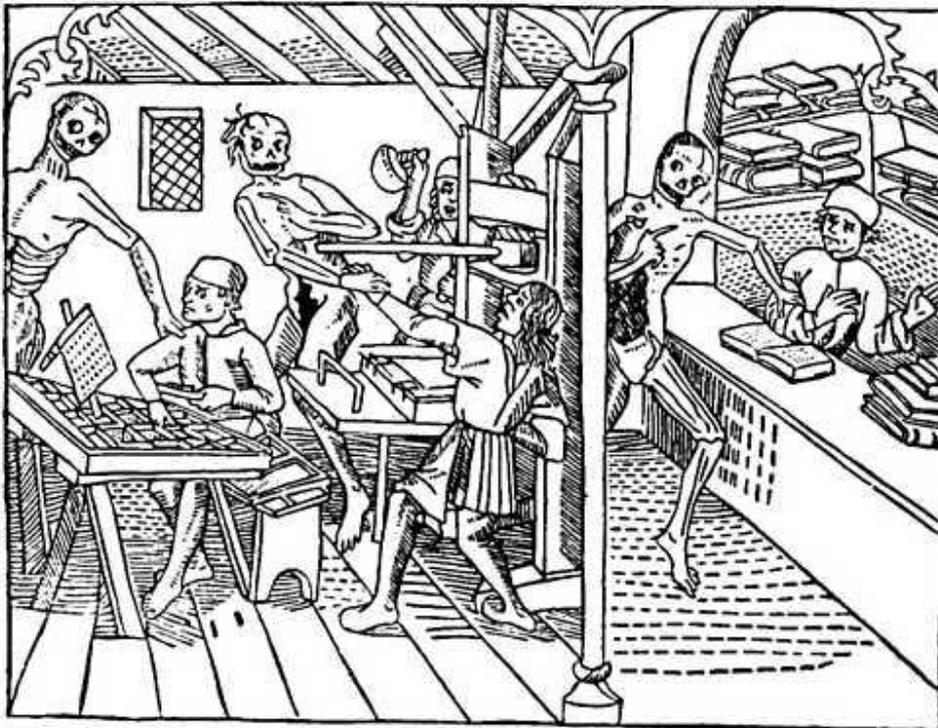
Printing houses

Early printing houses near the time of Gutenberg were run by "master printers." These printers owned shops, selected and edited manuscripts, determined the sizes of print runs, sold the works they produced, raised capital and organized distribution. Some other aspects of these printing houses were:

- Print shop apprentices: Apprentices, usually between the ages of 15 and 20, worked for master printers. Apprentices were not required to be literate, and literacy rates at the time were very low, in comparison to today. Apprentices prepared ink, dampened sheets of paper, and assisted at the press.
- Journeyman printers: After completing their apprenticeships, *journeyman* so called from the French "journée" for day printers were free to move employers. This facilitated the spread of printing to areas that were less print-centred.
- Compositors: Those who set the type for printing.
- Pressmen: the person who worked the press. This was physically labour intensive.

The earliest-known image of a European, Gutenberg-style print shop is the *Dance of Death* by Matthias Huss. This image depicts a compositor standing at a compositor's case being grabbed by a skeleton. The case is raised to facilitate his work. The image also shows a pressman being grabbed by a skeleton. At the right of the printing house a bookshop is shown.

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Dance of Death by Matthias Huss

Financial aspects

Court records from the city of Mainz document that Johannes Fust was, for some time, Gutenberg's financial backer.

By the sixteenth century jobs associated with printing were becoming increasingly specialized. Structures supporting publishers were more and more complex, leading to this division of labour. In Europe between 1500 and 1700 the role of the Master Printer was dying out and giving way to the bookseller – publisher. Printing during this period had a stronger commercial imperative than previously. Risks associated with the industry however were substantial, although dependent on the nature of the publication.

Bookseller publishers negotiated at trade fairs and at print shops. Jobbing work appeared in which printers did menial tasks in the beginning of their careers to support themselves. Publishing trade organizations allowed publishers to organize business concerns collectively. Systems of self-regulation occurred in these arrangements.



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At the end of the eighteenth century there were several remarkable innovations in the graphic techniques and those that were utilized to make their materials.

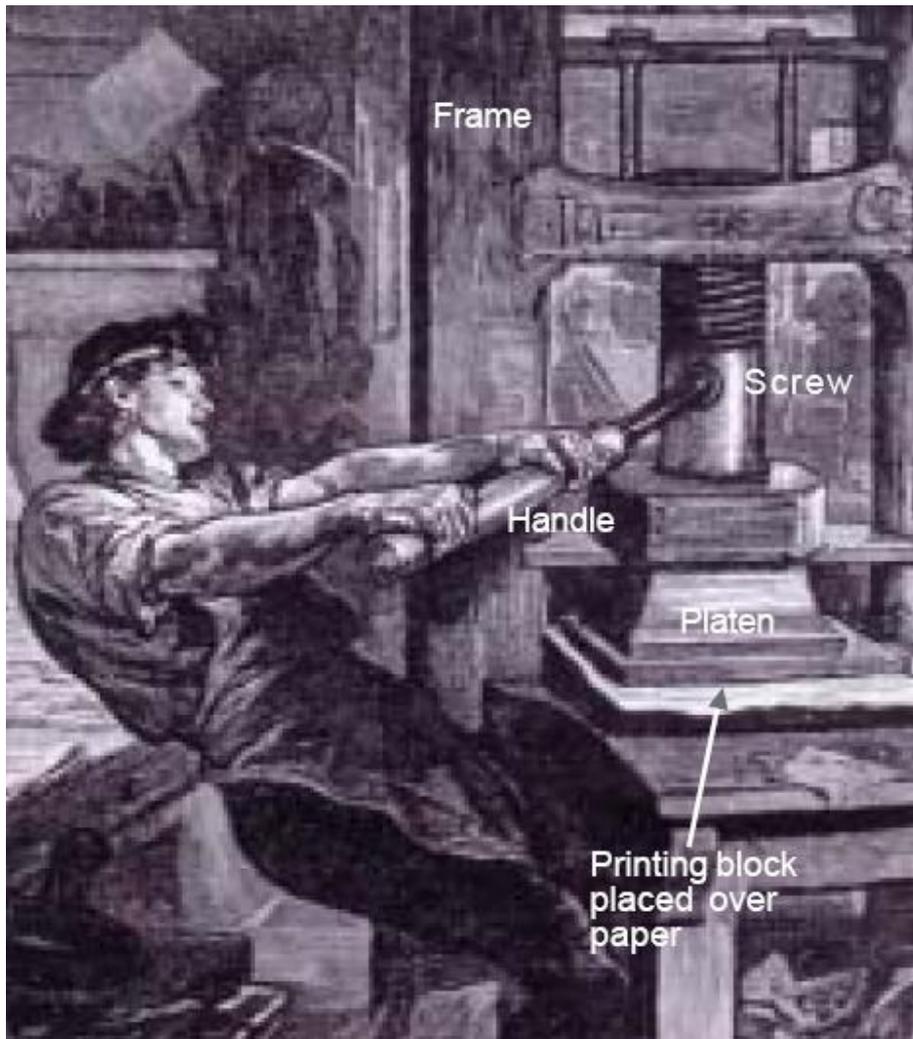
Modern Printing Technology

In 2006 there are approximately 30,700 printing companies in the United States, accounting for \$112 billion, according to the reports. Print jobs that move through the Internet made up 12.5% of the total U.S.

1.4 The Origin and Development of Print Technology

In the Mid-15th Century, things begin to change with the advent of the printing press. In 1452, Gutenberg conceives of the idea for movable type. In his workshop, he brings together the technologies of paper, oil-based ink and the winepress to print books. The printing press is not a single invention. It is the aggregation in one place, of technologies known for centuries before Gutenberg.

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Gutenberg's printing press.

One thing to remember is that Gutenberg gets credit for an invention that is thought to have been developed simultaneously in Holland and in Prague.

The other inventions brought together by Gutenberg in his pursuit of a printing press were:

- The adaptation for printing, of the wine or olive oil, screw-type press that had been in use for hundreds of years, throughout Europe and Asia.
- The adaptation of block-print technology - known in Europe since the return of Marco Polo from Asia at the end of the 13th century.



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- The development of mass production papermaking techniques. Paper was brought from China to Italy in the 12th C. but was thought too flimsy for books.
- Prior to the advent of the printing press, books were made of vellum calf or lamb skin because of its durability. Vellum is extremely durable. In San Simeon also known as Hearst's Castle, there are lampshades that William Randolph Hearst had made from 15th century Gregorian prayer books and the vellum is still in excellent condition. For books that took more than a year to produce, paper was too flimsy. However, for print books, vellum was too costly to produce.
- The development of oil-based inks. These had been around since the 10th century, but smeared on the vellum used to make books. The religious manuscripts used an egg-based tempera. This was unsuitable for printing with type.
- Gutenberg's contribution to printing was the development of a punch and mold *system*, which allowed the mass production of the movable type used to reproduce a page of text. These letters would be put together in a type tray, which was then used to print a page of text. If a letter broke down, it could be replaced. When the printing of the copies of one page was finished, the type could be reused for the next page or the next book.

These technological improvements stretch across five centuries. But the advent of the printing press did not bring about a great shift in the social organization of learning in Europe.

The first books to show up in print shops were bibles and religious tracts. The next books to attract publishers were the "humanist" texts but there was little or no printing of new ideas.

Many people went into the printing business and went right back out again. The reason was that the distribution of books was poorly organized. The market was there, and the potential for filling the demand, but the transport and control and "advertising" mechanisms were not in place.

In addition, there was still a low literacy rate in Europe. Most people did not know how to read at all. But non-literates were still affected by the book trade because books affected the elites, who controlled society. And people who could not read still had access to book culture because there were traveling storytellers who stood in the market and read from books as a means of making a living as entertainers.



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The situation was improved by the introduction of the Frankfort Book Faire. Cities in Europe held yearly fairs, featuring whatever kinds of things the city and surrounding area was good at producing. The county fair of today is the descendant of these early commerce fairs.

None of this is to say that new book printing posed much of a challenge to the power and prestige of the church. Early print books were conservative in content, and were filled with medieval images and ideas.

During this time, in addition to Bibles and prayer books, we get traditional material in print: romances such as Giovanni Boccaccio's *De Claris Mulieribus* Concerning famous women.

The printed book quickly becomes a regular object in the world. By 1501 there were 1000 printing shops in Europe, which had produced 35,000 titles and 20 million copies.

Impacts of the invention of Printing

Samuel Hartlib, who was exiled in Britain and enthusiastic about social and cultural reforms, wrote in 1641 that "the art of printing will so spread knowledge that the common people, knowing their own rights and liberties, will not be governed by way of oppression". For both churchmen and governments, it was concerning that print allowed readers, eventually including those from all classes of society, to study religious texts and politically sensitive issues by themselves, instead of thinking mediated by the religious and political authorities.

It took a long time for print to penetrate Russia and the Orthodox Christian world, a region including modern Serbia, Romania and Bulgaria) where reading ability was largely restricted to the clergy. In 1564, a White Russian brought a press to Moscow, and soon after that his workshop was destroyed by a mob.

In the Muslim world, printing, especially in Arabic or Turkish was strongly opposed throughout the early modern period printing in Hebrew was sometimes permitted. Indeed, the Muslim countries have been regarded as a barrier to the passage of printing from China to the West. According to an imperial ambassador to Istanbul in the middle of the sixteenth century, it was a sin for the Turks to print religious books. In 1515, Sultan Selim I issued a decree under which the practice of printing would be punishable by death. At the end of the century, Sultan Murad

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III permitted the sale of non-religious printed books in Arabic characters, yet the majority was imported from Italy.

Jews were banned from German printing guilds; as a result Hebrew printing sprang up in Italy, beginning in 1470 in Rome, then spreading to other cities including Bari, Pisa, Livorno and Mantuba. Local rulers had the authority to grant or revoke licenses to publish Hebrew books, and many of those printed during this period carry the words '*con licenza de superiori*' indicating their printing having been licensed by the censor) on their title pages.

It was thought that the introduction of the printing medium 'would strengthen religion and enhance the power of monarchs.' The majority of books were of religious nature with the church and crown regulating the content. The consequences of printing wrong material were extreme. Meyrowitz used the example of William Carter who, in 1584, printed a pro-Catholic pamphlet in Protestant-dominated England. The consequence of his action was hanging. The

This is how Mercier describes the impact of the printed word, and the power of reading in one of his books:

'Anyone who had seen me reading would have compared me to a man dying of thirst who was gulping down some fresh, pure water ... Lighting my lamp with extraordinary caution, I threw myself hungrily into the reading. An easy eloquence, effortless and animated, carried me from one page to the next without my noticing it. A clock struck off the hours in the silence of the shadows, and I heard nothing. My lamp began to run out of oil and produced only a pale light, but still I read on. I could not even take out time to raise the wick for fear of interrupting my pleasure. How those new ideas rushed into my brain! How my intelligence adopted them!'

Quoted by Robert Darnton, The Forbidden Best-Sellers of Pre-Revolutionary France, 1995.

widespread distribution of the Bible 'had a revolutionary impact, because it decreased the power of the Catholic Church as the prime possessor and interpreter of God's word.

Print comes to India

The printing press first came to Goa with Portuguese missionaries in the mid-sixteenth century. Jesuit priests learnt Konkani and printed several tracts. By 1674, about 50 books had been printed in the Konkani and in Kanara languages. Catholic



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priests printed the first Tamil book in 1579 at Cochin, and in 1713 the first Malayalam book was printed by them. By 1710, Dutch Protestant missionaries had printed 32 Tamil texts, many of them translations of older works. The English language press did not grow in India till quite late even though the English East India Company began to import presses from the late seventeenth century. From 1780, James Augustus Hickey began to edit the *Bengal Gazette*, a weekly magazine that described itself as ‘a commercial paper open to all, but influenced by none’. So it was private English enterprise, proud of its independence from colonial influence that began English printing in India.

Hickey published a lot of advertisements, including those that related to the import and sale of slaves. But he also published a lot of gossip about the Company’s senior officials in India. Enraged by this, Governor-General Warren Hastings persecuted Hickey, and encouraged the publication of officially sanctioned newspapers that could counter the flow of information that damaged the image of

The power of the printed word is most often seen in the way governments seek to regulate and suppress print. The colonial government kept continuous track of all books and newspapers published in India and passed numerous laws to control the press. During the First World War, under the Defence of India Rules, 22 newspapers had to furnish securities. Of these, 18 shut down rather than comply with government orders. The Sedition Committee Report under Rowlatt in 1919 further strengthened controls that led to imposition of penalties on various newspapers. At the outbreak of the Second World War, the Defence of India Act was passed, allowing censoring of reports of war-related topics. All reports about the Quit India movement came under its purview. In August 1942, about 90 newspapers were suppressed.

the colonial government. By the close of the eighteenth century, a number of newspapers and journals appeared in print. There were Indians, too, who began to publish Indian newspapers. The first to appear was the weekly *Bengal Gazette*, brought out by Gangadhar Bhattacharya, who was close to Rammohun Roy.

1.5. TYPES OF PRINTING

‘I’m a printer’ can mean many different things, depending on a particular process:

1. Offset Lithography (the most common printing process today (the workhorse! It offsets ink from metal plates to a rubber blanket cylinder) to the paper. Almost every commercial printer does offset printing.



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2. Engraving think "fine stationery." Produces the sharpest image of all. Image feels indented run your fingers over the back side of the sheet. Most law firms still use engraving.
3. Thermograph raised printing, less expensive than engraving. Uses special powder that's adhered to any color ink. Mainly used for stationery products.
4. Reprographics general term covering copying and duplicating. Think in-house copying departments and copy or quick-printing shops. They take your originals and make duplicates of them.
5. Digital Printing the newest printing process and the least understood! Includes all processes that use digital imaging to create printed pieces. Doesn't use film. Think desktop to the digital press. For short-run, fast-turnaround jobs. Limitations include color, paper choices, and quality. But not for long -- the technology is exploding!
6. Letterpress the original process founded by Gutenberg in 1440. "Relief" printing like rubber stamps, images on the plate are higher than the surface. Fewer and fewer printers are doing fine letterpress.
7. Screen a.k.a. silk-screening. Ink is forced through a screen following a stencil pattern. Used for ring binders, t-shirts, bumper stickers, billboards.

Bonus types of printing:

- i. Flexography special type of printing for packaging products. The plates used are flexible. Products include cardboard boxes, grocery bags, gift-wrap, and can and bottle labels.
- ii. Gravure prints directly from cylinder to paper. Used when printing for millions of impressions think magazines, newspapers, and direct mail catalogs.

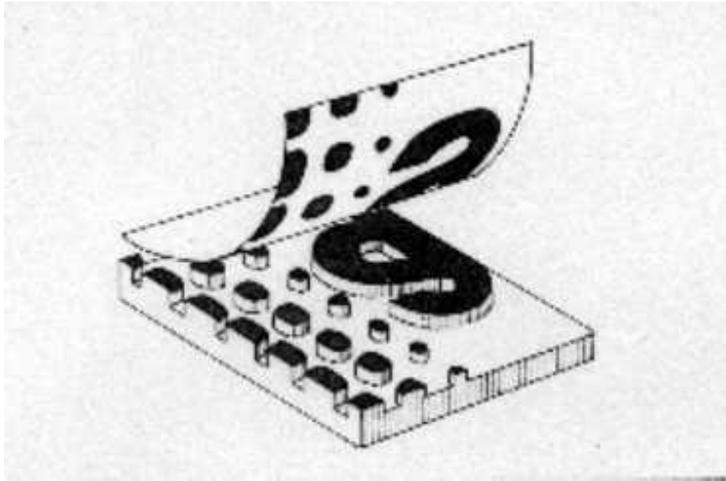
1.5.1. Four major Printing Processes

1. Relief printing process

It is the oldest printing process and came into being with the invention of movable types in the fifteenth century by Johann Gutenberg. The matter, which is to be printed, is a mirror image or is backward reading right to left. The image to be printed is raised and the non-image area is depressed. The basic principle behind this process is that there is a physical, separation between the image areas and the

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non-image areas. Image area is that area on the printing surface which receives ink, i.e. raised portions of a rubber stamp. Non-image area is that area on the printing surface, which does not have received ink, i.e. depressed portions of a rubber stamp. Image area is raised, and catches ink to produce impression on paper while non-image area is lowered and do not catch ink.



The Process

The relief printing plates are prepared first, i.e. the master is prepared with a combination of metallic characters or types assembled together along with the illustrations prepared by photomechanical methods called blocks. Both of them are combined and locked together in a frame. In this the image areas are raised while non-image areas are depressed on the master or printing surface. Ink rollers on the master apply ink, image areas receive ink and non-image areas don't receive ink.

The printing surface or master is then pressed against the substrate to obtain the impression. Ink is transferred from image areas on the substrate. The non-image areas, which are depressed, don't come in contact with the inking rollers or the paper and so give no impression.

Examples for this process are letter press and Flexography

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2. Letter Press Printing Process



The name letterpress brings to mind the images of raised letters pressing against a surface, on which ink is transferred. Letterpress printing is also meant for printing borders, rules, illustrations, etc. letterpress is a relief printing process. On the basis of printing surface or master and the surface on which paper is placed, the letter press printing machines can be classified in three groups:

A Platen Press - the surface on which the paper to be printed is placed for printing is flat and is called platen, and the master/printing surface is also placed on a flat surface known as the flatbed. Since the paper is put on the platen flat surface), therefore this group of machines is also known as platen press.

These types of machines are best suited for printing letter heads, cards, bill forms, leaflets, pamphlets, inserts, visiting cards, office files, serial numbering, etc. platen presses can also do embossing, die cutting, creasing and foil stamping, numbering, etc. which other printing presses just cannot. One main advantage is that printing work can be stopped in between and any correction can be carried out.

B) Flat to cylinder or plane surface to cylinder- these groups of letterpress machines are known as flat bed cylinder presses. The surface of the printing surface remains flat while the surface carrying paper is cylindrical. Earlier these presses were operated by steam power. But now days they are operated by electrical power.

These machines are efficient enough to print considerably longer run jobs i.e. in larger numbers and for much bigger paper sizes. The great advantage is that flat to cylinder type of machines are cheaper and flexible in printing. Since there is a revolving impression cylinder and is power driven, the printing speed is quite high.

C Cylinder to cylinder Rotary - here the printing surface as well as the platen are cylindrical. The printing surface is prepared by a duplicating process in round



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shape curved or flexible) to be wrapped around the cylinder. The printing surface or the master has relief images. It is known as stereotype. These are prepared by electronic and mechanical techniques. The printing surface or cylinder and the impression cylinder maintain consistency and proportion with each other.

The paper printed is in rolling form. After printing it is cut into sheets as per the requirement. This is a fast method of printing. These machines are suitable for printing of newspapers, magazines, books, etc in a large quantity. Also the use of paper in the web form allows continuous printing. Two, three or four colors are possible in these machines. The number of colors that can be printed depends on the number of units through which the paper passes during printing. Since the cylinders are in continuous motion, energy is not wasted in accelerating them again and again.

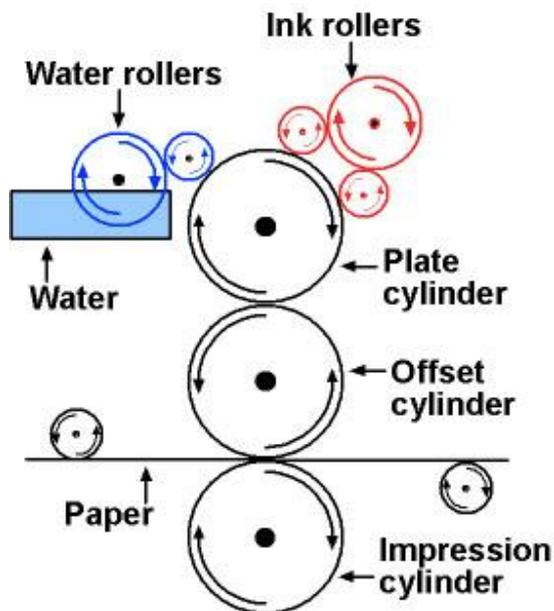
3. Plano graphic

It is based on the principle that water and oil do not mix and repel each other. The term Plano graph, means that the image and the non-image areas are on the same plane unlike in relief process where the image areas are raised. In this process both image and non-image areas are chemically separated but both lie on the same plane. Image areas are prepared with certain greasy or oily materials. Non-image areas are prepared with some water absorbing materials.

Examples are lithography, offset

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Offset



Offset comes under Plano graphic printing process. It is based on the principle that water and oil don't mix with each other. The image areas are oily or greasy in nature and readily accept oil or grease based inks. On the other hand, non-image areas accept water and hence repel away the oily or greasy inks. Thus image and non-image areas are chemically separated on the printing surface.

The advantages of offset printing include:

- Consistent high image quality—sharper and cleaner than letterpress printing because the rubber blanket conforms to the texture of the printing surface
- Usability on a wide range of printing surfaces in addition to smooth paper (e.g., wood, cloth, metal, leather, rough paper)
- Quick and easy production of printing plates
- Longer plate life than on direct litho presses because there is no direct contact between the plate and the printing surface.

Offset machines are of two types:

- **Web Offset**
- **Sheet fed Offset**



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In web offset the paper is in the roll form or web form. In sheet fed machines the paper is fed in the form of sheets. Both these machines are available in different sizes. The process is fast and can print more number of copies. Offset can also print on larger size papers and on the other materials like tin, plastics, foil, etc. the amount of ink and the thickness of the ink can also be controlled. Good quality pictures, multi colors can be easily printed. The main applications of offset printing are:

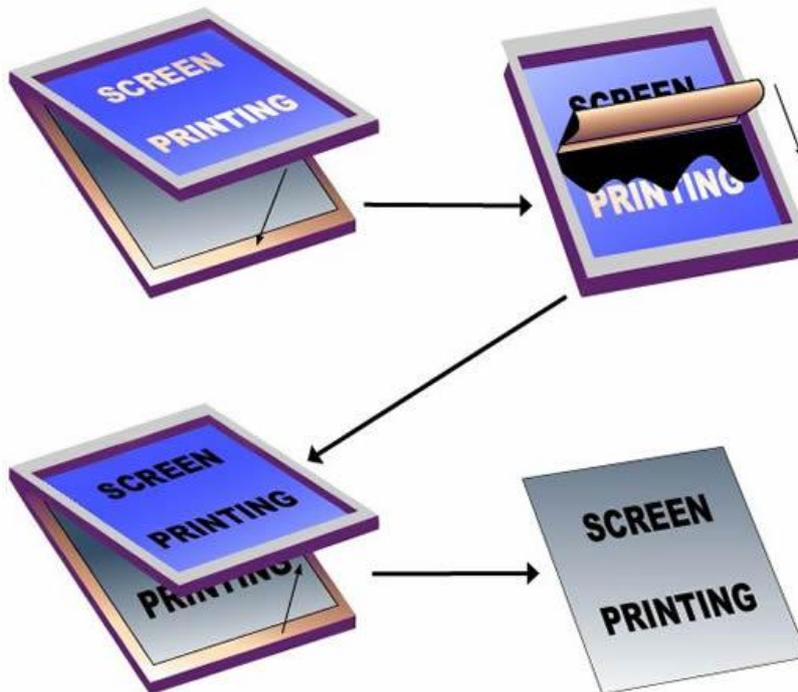
- Offset machines are used in almost all national daily newspapers
- They are used for printing of text books and other books
- Very good quality multi colored calendars can be printed by these machines
- This also can be used for printing of magazines, posters and catalogues
- Fine line scripts as in Urdu languages can be printed easily
- Large size maps, plans and packaging materials can be printed

4. Screen Printing Process

It is one of the major printing processes used these days for a wide range of printing jobs. The artists for their creative works used early silkscreen printing. It is also known as porous printing. Now, a day silk is not only the fabric used. Nylon, Dacron, polyester is also being used. This process is based on the fundamental fact that by forcing ink through the pores of selected areas of a silk screen, images can be formed on the substrate placed, below the screen. The selected porous areas on the printing surface are the image areas while the blocked areas on it are the non-image areas.

By using this process, printing can be done on rubber, plastic, paper, glass, etc. the image can be transferred to almost any surface whether flat or odd shaped. The process is very simple and cost effective and is best suited for package, display designs, stickers, containers, etc. wedding cards; visiting cards, letter heads, etc are printed with a good quality better than letter press. Pictures can also be printed to a certain extent. All the material required for printing by the process is simple, inexpensive and easy to handle.

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Screen printing is arguably the most versatile of all printing processes. It can be used to print on a wide variety of substrates, including paper, paperboard, plastics, glass, metals, fabrics, and many other materials, including paper, plastics, glass, metals, nylon and cotton. Some common products from the screen printing industry include posters, labels, decals, signage, and all types of textiles and electronic circuit boards. The advantage of screen printing over other print processes is that the press can print on substrates of any shape, thickness and size.

A significant characteristic of screen printing is that a greater thickness of the ink can be applied to the substrate than is possible with other printing techniques. This allows for some very interesting effects that are not possible using other printing methods. Because of the simplicity of the application process, a wider range of inks and dyes are available for use in screen printing than for use in any other printing process.

Utilization of screen printing presses has begun to increase because production rates have improved. This has been a result of the development of the automated and rotary screen printing press, improved dryers, and U.V. curable ink. The major chemicals used include screen emulsions, inks, and solvents, surfactants, caustics and oxidizers used in screen reclamation. The inks used vary dramatically in their formulations.



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Screen printing consists of three elements: the screen which is the image carrier; the squeegee; and ink. The screen printing process uses a porous mesh stretched tightly over a frame made of wood or metal. Proper tension is essential to accurate color registration. The mesh is made of porous fabric or stainless steel mesh. A stencil is produced on the screen either manually or photo chemically. The stencil defines the image to be printed in other printing technologies this would be referred to as the image plate.

Screen printing ink is applied to the substrate by placing the screen over the material. Ink with a paint-like consistency is placed onto the top of the screen. Ink is then forced through the fine mesh openings using a squeegee that is drawn across, applying pressure thereby forcing the ink through the open areas of the screen. Ink will pass through only in areas where no stencil is applied, thus forming an image on the printing substrate. The diameter of the threads and the thread count of the mesh will determine how much ink is deposited onto the substrates.

Many factors such as composition, size and form, angle, pressure, and speed of the blade squeegee) determine the quality of the impression made by the squeegee. At one time most blades were made from rubber which, however, is prone to wear and edge nicks and has a tendency to warp and distort. While blades continue to be made from rubbers such as neoprene, most are now made from polyurethane which can produce as many as 25,000 impressions without significant degradation of the image.

If the item was printed on a manual or automatic screen press the printed product will be placed on a conveyor belt which carries the item into the drying oven or through the UV curing system. Rotary screen presses feed the material through the drying or curing system automatically. Air drying of certain inks, though rare in the industry, is still sometimes utilized.

The rate of screen printing production was once dictated by the drying rate of the screen print inks. Due to improvements and innovations the production rate has greatly increased. Some specific innovations which affected the production rate and have also increased screen press popularity include:

1. Development of automatic presses versus hand operated presses which have comparatively slow production times.
2. Improved drying systems which significantly improves production rate.
3. Development and improvement of U.V. curable ink technologies

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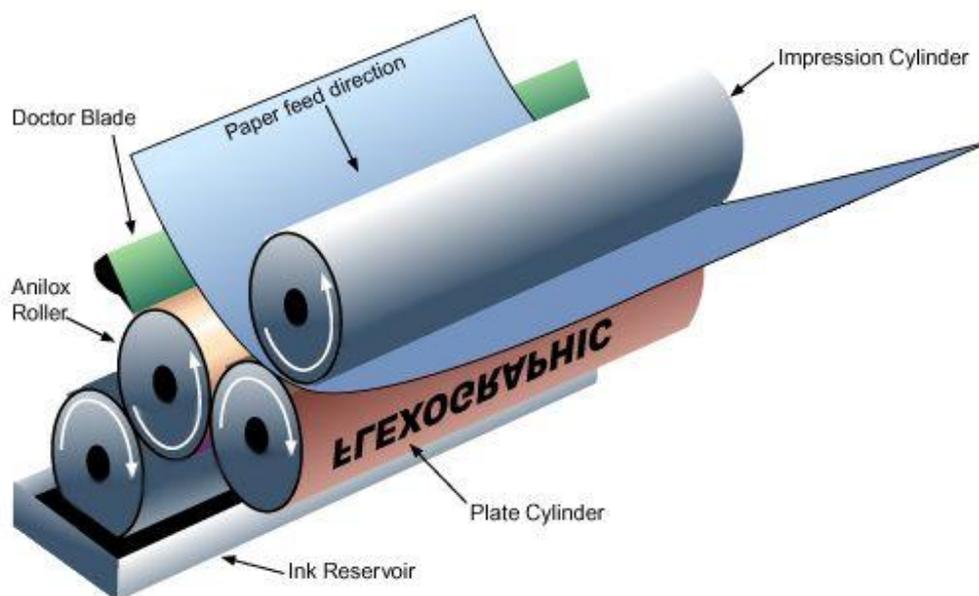
4. Development of the rotary screen press which allows continuous operation of the press. This is one of the more recent technology developments.

Other Printing Methods

Digital / Desktop Printing: Desktop printing is important to desktop publishing. It was primarily the introduction of the Apple LaserWriter, a PostScript desktop print. Inkjet and laser printers are the most common type of desktop printers and are generally used for personal small volume printing and proofing.

Offset Lithography: Offset lithography is the most commonly used commercial printing process for the bulk of desktop publishing on paper. Offset lithography is used on both sheet-fed and web offset presses. The three primary differences in offset printing and desktop printing such as inkjet and laser) are the colors of ink and the way the ink is placed on the paper as well as the type of machinery used to accomplish the task.

Flexography: Frequently used for printing on plastic, foil, acetate film, brown paper, and other materials used in packaging, flexography is also known as flexographic printing or flexo. Some typical applications for flexography are paper and plastic bags, milk cartons, disposable cups, and candy bar wrappers. Flexographic printing may also be used for envelopes, labels, and newspapers.

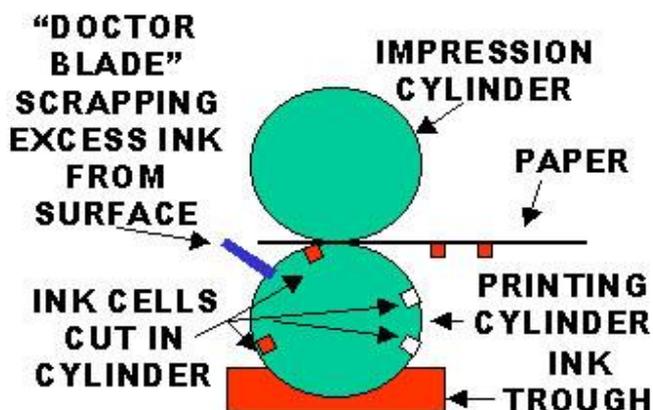


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Flexography is a printing process which utilizes a flexible relief plate that can be adhered to a printing cylinder. It is basically an updated version of letterpress. It is much more versatile than letterpress in that it can be used for printing on 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.

Flexography continues to be one of the fastest growing print processes and is no longer reserved just for printing specialty items. The ability of flexography to print on a variety of substrates allows the process to be used for a wide range of printed products. Food packaging is an important market because of the ability of flexography to print on non-porous substrates. This ability makes it useful for printing on plastic bags as well. Other common applications printed with flexography include gift wrap, wall covering, magazines, newspaper inserts, paperback books, telephone directories, and business forms.

Gravure Printing: With **gravure** printing an image is etched on the surface of a metal plate, the etched area is filled with ink, and then the plate is rotated on a cylinder that transfers the image to the paper or other material. Like flexography, gravure printing is often used for high-volume printing of packaging, wallpaper, and gift wrap using fast-drying inks. Although less common, gravure printing may also be used for printing magazines, greeting cards, and high-volume advertising pieces. Gravure printing is commonly used for labels and packaging, competing against flexography. Photogravure is a process used mostly for fine art prints.



Gravure printing



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Laser / Digital Printers: Speed and lower operation costs make laser printers attractive to many businesses. Color lasers can be found at service bureaus and printers and are often used to produce high-resolution color digital proofs. Adobe PostScript capabilities found in many laser printers makes them popular with graphic designers and desktop publishers who often utilize EPS images and PostScript files.

Other Commercial Printing Processes:

Although not widely used today by desktop publishers, the art of engraving is not lost and can often be found in fine letterhead.

Thermography is often used in place of the more expensive engraving process to produce wedding invitations, business cards, and letterhead with raised printing.

Mostly replaced by offset printing and other processes, letterpress printing is still used for some newspapers, books, and limited edition prints. Letterpress may also be used for printing business cards, letterhead, posters, and some forms.

Screen or silkscreen printing is popular for t-shirts but works for many other non-textile projects as well such as CDs, vehicle billboards, signs, and posters.

Stochastic printing may be used for some fine art prints.

Digital Ink-based Printing: Some digital ink-based printing processes are used for desktop printers and quick printers normally use others for higher volume business printing or, inkjet being the most common.

Dye-sublimation printers use high heat and solid dyes to produce photo lab-quality images and are favored by some graphic designers for high-end proofing and by some businesses who want to produce the best possible color materials in-house.

Currently, **inkjet printing** is the primary printer technology for home, home offices, and many small businesses. Inkjet printers are inexpensive and produce good color output but can be slow. Best results are normally achieved when printing to specially coated inkjet or photo papers.

Solid ink printers are generally low-cost to operate, not requiring the more expensive inkjet papers to achieve good results. However, solid ink printing output is still not as high quality as laser or inkjet printers.

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Thermal auto chrome printers are aimed primarily at digital photographers.

Thermal wax printers produce vibrant color but require very smooth or specially coated paper or transparencies for best output. Thermal wax printing technology works well for businesses that need to produce large quantities of transparencies for colorful business presentations.

Here is a glance at the different types of printing for your print jobs:



Offset Lithography

The most common printing method in the industry, most printers use offset lithography to save on ink and limit set up time. Hence, you are able to avail of a more affordable and cost effective print job for your color printing requirements. What printers usually do is to offset the ink (thus, the name) from metal plates to a rubber cylinder and then transfer it onto the paper stock.

Digital Printing

It is probably the most popular printing method since its introduction. Digital printing is very effective since it reduces the time to complete the printing process. It doesn't need films and plates anymore. What it does is to transfer the digital file directly to the printing press with the help of a computer. It's relatively fast that customers often rely on digital printing to meet deadlines and schedules.



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Letterpress



Created by Gutenberg, the Letterpress is considered as one of the first and original printing methods of all time. The letterpress gave birth to the concept of relief printing, where the image being printed is raised from the surface. However, the method is slowly going obsolete with the new and much faster methods being introduced in the market today.

Electrostatic Printing



Similar to photocopying, this method lets the color attach to a drum and is blended with the paper with the application of heat. It is similar to digital printing as it also provides cost effective production of short print runs.

Thermography



This method produces raised image that you see mostly in stationeries. What the printer does is to use a special powder or dust that easily sticks to wet ink. Then they apply heat to blend the ink and the powder to form the raised image.

These are still more types of printing methods. The bottom line is to know what would be the most suitable to your needs. We hope that the next time you hire a commercial printer for your marketing

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collateral you are able to discuss clearly what kind of printing method you require to achieve the results you imagined.

1.6. COMPARISON BETWEEN PRINTING PROCESSES

Offset printing Lithography

How it looks

Ink sits flat on the surface of the paper. Nearly all-modern printing is offset. Most short-run jobs are now being done digitally instead of offset as personal and trade machines become better and cheaper.

Differences in quality

Make sure that the printer you want to use can deliver the quality you expect. Like any service or craftsman, printers come with many different standards of refinement. Any printer can show you previous work. If you think the price is a bit low, or you think the printing looks a little fuzzy, the printer is most likely using paper printing plates. If you want high-quality offset, you will want a printer with a good reputation who uses aluminum plates. There can be quite a difference in price between high and low qualities printing. A printer who gives you good, clean lines and sharp type and stands behind his work can make a difference of a couple of hundred dollars for an invitation job.

How it is done?

The basic principle of offset printing, the dominant printing process, is this simple: ink and water don't mix. Early lithographers etched images onto a flat stone. These images would accept ink, while the porous stone accepted water. When ink was applied, it stayed on the greasy image area and avoided the rest of the stone. Modern lithography uses the same concept but adds one important element. In modern presses, the image is transferred from the printing plate to a rubber blanket and then to the paper. Hence the name "offset." Although there are many different kinds, sizes and qualities of offset presses, the basic configuration remains the same. When the printing plate is exposed, an ink receptive coating is activated at the image area. On the press, the plate is dampened, first by water rollers, then by ink rollers. Ink adheres to the image area and water to the non-image area. As the cylinders rotate, the image is transferred to the blanket. Paper passes between the blanket cylinder and the image is transferred to the paper



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Differences in quality

Ask to see the printer's work. Be suspicious if the printer says anything can be done letterpress. This is almost true, but pushing the medium to its limits can get expensive and still lead to some unhappy results. A good printer will guide you in your choices of type and paper. For instance, extremely small type will not look great on thick, soft paper where you wish to see a deep impression. The pressure required to achieve such an impression squeezes some ink out between the paper and the printing surface, causing type and art to thicken slightly. Sometimes this will cause the "e" of a small piece of type to "close."

Warnings

Usually you don't want to print a photograph or fine dot screen by letterpress. Most papers you want to print on will cause images to look a bit muddy. Metallic inks, such as silver or gold, do not print "shiny" on most papers. If metallic is a priority, check out foil stamping.

How it is done?

The world standard method for hundreds of years, letterpress gave way to offset during the 1930's. Letterpress is now relegated to the specialty category of art prints and invitations. The raised surface of the plate can be achieved by a number of means, such as woodcarving or engraving, linoleum cutting, or, most commonly, photoengraving.

Gravure

How it looks

Almost like offset, but extremely high quality. The cost is prohibitive and it is rare if ever that anyone would consider this method for an invitation job.

How it is done

Basically, gravure turns everything in the image into halftone dots. The plate cylinder consists of tiny cells, varying in depth and width that hold the ink. As the press runs, a doctor blade scrapes excess ink off the surface of the plate, leaving ink only in cells. As the paper contacts the plate, the ink is transferred, reproducing



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type, rules, graphics, and photographs as composites of very fine dots. Gravure is used only in very long runs, usually for publications and packaging printing

Screen Printing

How it looks

Ink sits on the surface of the paper. It is often thick and so opaque that the color of the surface does not affect the ink color. Can be used for semi-fine lines and type.

Quality

Screen printers can show you their work.

How it is done

Although once thought of as being oriented to short production runs, modern high-speed technology allows for volume production where brilliant, accurate colors, and close tolerance are necessary. Ink is expressed through a stretched fabric mesh by a squeegee blade to reproduce the original image onto the substrate below. Screen-printing is not limited to press size or the same of any substrate. A variety of materials such as paper, plastic, metal, fabric and glass can be screen-printed

Engraving

How it looks

Your image is raised above the surface of the paper. Yields the sharpest image of all the traditional printing methods.

Quality

Check to see the engraver's work. As with anything, quality varies, but engraving requires such specialized machinery that anyone who does it is likely to be good at it.

Warning

Engraving will almost always be the most expensive printing choice you can make, due to make-ready time and quality requirements. Photographs and illustrations requiring a screen don't render too well.



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How it is done?

The most common use of engraving is to print money, anything that has very fine detail. Plates for engraving are made of steel for very long runs or copper for short runs. In engraving ink is applied to the plate the ink then fills the cavities and the plate is wiped clean leaving the recessed areas image area) filled with ink. Intense pressure is used to transfer the image onto the substrate

Thermography

How it looks

Ink is raised above the surface of the paper. It is an affordable imitation of engraving.

Quality

Thermography can vary in price and quality greatly. The best thermography can be hard to tell apart from engraving, but even the best cannot reproduce the finest lines that can be achieved through engraving.

Warnings

Check printer's samples. The main warning we have is a repetition of above. Choose a printer who can achieve fine lines if this is what your art or type requires. If the quality is not there, thermography can be uglier than and as tasteless as just about anything.

What are the differences between screen, offset, and thermal disc printing?

Screen Printing Produces:

With screen-printing, the image is stenciled onto the disc face by transferring ink through a fine mesh screen, using CMYK inks. C=Cyan, M=Magenta, Y=Yellow, K=Black, or Pantone, Hex chrome 6 color), and other color-matching processes.

Offset Printing Produces:

The offset printing process uses an intermediate blanket cylinder to transfer an image from the image carrier to the disc face, also using CMYK inks, C=Cyan, M=Magenta, Y=Yellow, K=Black, or Pantone, Hexachrome 6 color), and other



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color-matching processes.

Thermal Printing Produces:

With thermal printing, your image is printed on a piece of plastic thermo chromic paper) and is then adhered to the disc by heating and stamping the disc and thermo chromic paper together. This is a dry toner printing process that strictly uses CMYK color

Letterpress

How it looks.

Your type or image will be indented into the paper. Using a raised surface printing plate or type, the depth of the resulting "bite" will vary depending upon the type of paper. Thicker, softer papers will carry a deeper impression than hard or thin papers.

Waterless lithography litho or dry offset printing driography has been in existence for several years, but few research studies have been in the field of waterless lithography. As a result, many graphic communications professionals jumped into installing waterless litho presses without extensive knowledge about the waterless litho process. Eventually, most of them became dissatisfied with waterless litho or confronted unanticipated problems with waterless litho.

William C. Lamparter, President of Print Com Consulting, performed an interview survey for the American Printer magazine in mid 1994. Lamparter 1994 found that waterless lithographers produce higher image quality than that of conventional lithographers. Ben Wong, David Strong, Rick Stone, and Zhenhua Xie to measure the print characteristics of waterless litho conducted two experimental studies. They measured different print characteristics, such as, color consistency, ink density, dot gain, ink gloss, and print contrast. Wong concluded "we have had good results but there are extra plate and ink costs".

Quality of the printed products plays an important role in increasing market share and raising profits. Ruggles 1996 listed quality of the product as one of the factors when determining pricing. He stated, "Typically, higher quality products justify higher selling price". An empirical study was conducted to determine quality of printed products produced by waterless or dry lithography litho and



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conventional or wet lithography. This paper investigates the quality differences between waterless and conventional litho products.

Purpose

The purpose of the research was to determine quality rankings of waterless and conventional litho products. Five quality aspects were used to determine quality of printed products: 1 color consistency, 2 ink density, 3 dot gain, 4 print contrast, and 5 ink gloss.

Problem

The problem of the research was to compare quality of printed products of waterless litho with that of traditional litho. It was found from the review of

Cost and value

One of the greatest barriers in recent years to the widespread adoption of color in everyday office environments is the belief that it simply costs too much. And, in fact, color printers traditionally have generally been much more expensive than black-and-white devices. Today, that price has come down dramatically, but the belief in the marketplace that color costs too much remains to some extent. Unfortunately, the legacy of color has left many users with the perception that color is expensive. So just how big is the cost difference between color and black-and-white today? Not very—especially when you factor in the value that color can add to many everyday communications.

Closing the gap on cost

In terms of simple acquisition costs, the difference between color printers and black-and-white printers is not nearly as great as it once was. In Hewlett-Packard's portfolio of color printers, for example, business inkjet printers start at less than \$200 and laser printers start at less than \$500. And while you can certainly find black-and-white laser printers in HP's portfolio that start at less than \$500, purchase price isn't the only consideration to keep in mind here. Value is as important as, if not more important than, price.

Factoring in value

Color may add to the cost of acquiring printers in everyday office environments, but it's important to remember that color also adds *value*. And as the gap on price



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closes, that added value increasingly offsets the additional expenditure. Further, when color is deployed precisely when and where it is needed, as part of a balanced deployment, the overall cost may be lower than if it is done as a blanket upgrade.

Color adds value by making communications more effective, which in turn can make people and organizations more productive. For example, color-coding reduces visual search time by up to 80 percent, color improves comprehension by up to 73 percent, and messages printed in color are up to 78 percent more likely to be remembered.

Some types of communication are just inherently more effective when they include color. Think of detailed technical drawings or long, complicated spreadsheets, in which color can be used to distinguish various images or call attention to different points which would otherwise take much more time and effort to discern.

Technology

When color is added to the printed page, the devices involved use new technologies and capabilities to add a new dimension to a document. In this context, color is very different from black-and-white printing by virtue of the qualities and concerns it inevitably must introduce.

Defining print quality differently

Traditionally, the measurement of a printer's output quality has been resolution, usually expressed in terms of dots per inch (DPI). Color inkjet printing, however, is different. Modern inkjet printers work at a sub-DPI level, producing tiny droplets of ink that can fit by the dozens inside a single DPI dot. Inside each of these dots, sophisticated color-mixing technology is used to enhance the colors and produce high-quality images. For this reason, some color printers with a lower DPI rating can actually produce higher image quality output because of the level of color droplet control they exercise.

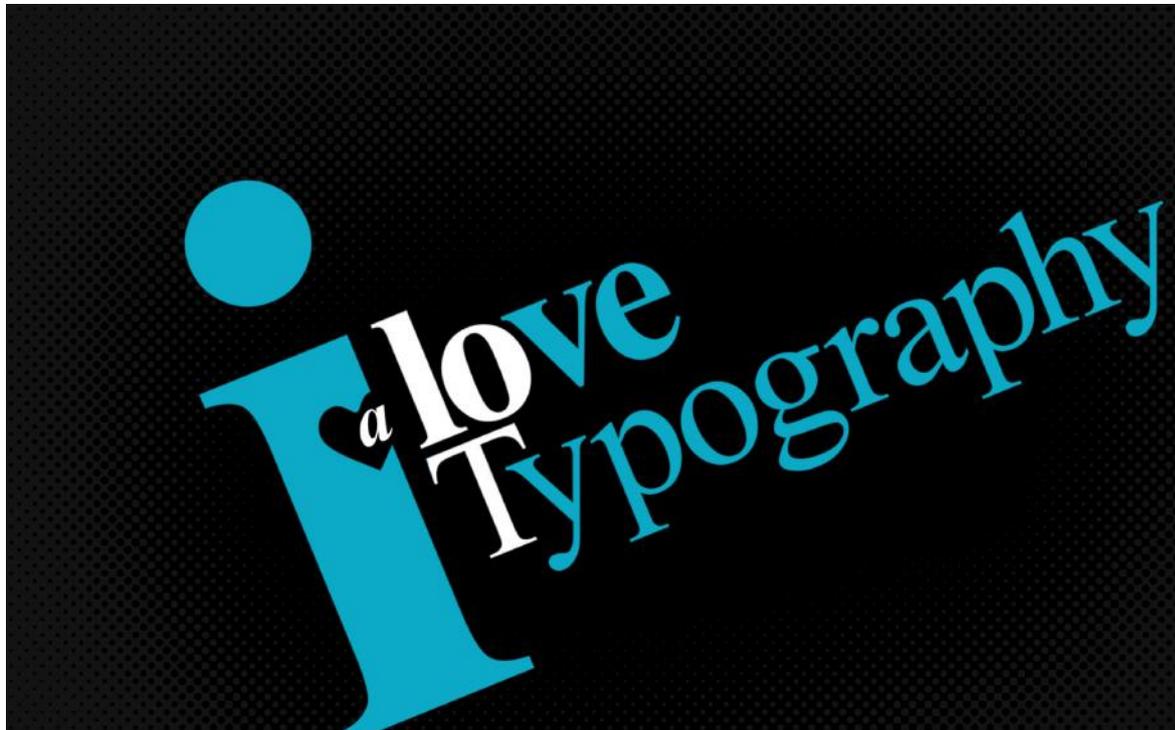
Another technology-related factor that relates to print quality in color printers is a phenomenon called dot growth, or wicking that is unique to inkjet printers. Dot growth refers to the spread of ink as it is absorbed by paper. Sometimes, when you use plain paper with an inkjet printer, the paper fibers spread the ink too much, reducing image quality. Using paper with a lower ink absorption rate eliminates the problem. Dot growth isn't an issue with laser printers because they use a different mechanism to transfer printed images to paper.

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Matching colors accurately

Black is black. But blue and other colors come in a whole range of shades. That's one big difference between color and black-and-white printing. With color, you have to be concerned about ensuring that the colors you use match and are consistent from device to device—that, for example, the blue you see on your computer screen resembles the blue you see on the page you print. Color matching technology is used to compensate for the differences between how different devices process and display color.

1.7. TYPOGRAPHY



Typography is the art and techniques of type design, modifying type glyphs, and arranging type. Type glyphs characters are created and modified using a variety of illustration techniques. The arrangement of type is the selection of typefaces, point size, line length, leading line spacing and letter spacing.

Typography is performed by typesetters, compositors, typographers, graphic artists, art directors, and clerical workers. Until the Digital Age typography was a specialized occupation. Digitization opened up typography to new generations of visual designers and lay users.



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History

Typography traces its origins to the first punches and dies used to make seals and currency in ancient times. Typography with modular moveable metal type began in 13th-century Korea, and was developed again in mid-15th century Europe with the development of specialized techniques for casting and combining cheap copies of letterpunches in the vast quantities required to print multiple copies of texts.

Scope

In contemporary use, the practice and study of typography is very broad, covering all aspects of letter design and application, including typesetting & typeface design; handwriting & calligraphy; graffiti; inscriptional & architectural lettering; poster design and other large scale lettering such as signage and billboards; business communications & promotional collateral; advertising; word marks & typographic logos logotypes ; apparel clothing ; vehicle instrument panels; kinetic typography in motion picture films and television; and as a component of industrial design—type resides on household appliances, pens and wrist watches.

Since digitization typography's range of applications has become more eclectic, appearing on web pages, LCD mobile phone screens, and hand-held video games. The ubiquity of type has led typographers to coin the phrase "**Type is everywhere**".

Typography generally follows four principles, using repetition, contrast, proximity, and alignment.



Text typography

Text typeset in Iowan Old Style roman, italics and small caps, optimised at approximately 10 words per line, typeface sized at 14 points.



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In traditional typography, text is *composed* to create a readable, coherent, and visually satisfying whole that works invisibly, without the awareness of the reader. Even distribution with a minimum of distractions and anomalies are aimed at producing clarity and transparency.

Choice of fonts is perhaps the primary aspect of text typography—prose fiction, non-fiction, editorial, educational, religious, scientific, spiritual and commercial writing all have differing characteristics and requirements. For historic material, established text typefaces are frequently chosen according to a scheme of historical *genre* acquired by a long process of accretion, with considerable overlap between historical periods.

Contemporary books are more likely to be set with state-of-the-art seriffed "**text romans**" or "**book romans**" with design values echoing present-day design arts, which are closely based on traditional models such as those of Nicolas Jenson, Francesco Griffo a punchcutter who created the model for Aldine typefaces, and Claude Garamond. With their more specialized requirements, newspapers and magazines rely on compact, tightly-fitted text romans specially designed for the task, which offer maximum flexibility, readability and efficient use of page space. Sans serif text fonts are often used for introductory paragraphs, incidental text and whole short articles. A current fashion is to pair sans serif type for headings with a high-performance seriffed font of matching style for the text of an article.

The text layout, tone or *color* of set matter and the interplay of text with white space of the page and other graphic elements combine to impart a "feel" or "resonance" to the subject matter. With printed media typographers are also concerned with binding margins, paper selection and printing methods.

Readability and legibility

Readability concerns how easily or comfortably a typeset text reads. Studies of readability suggest that our ability to read is based on recognition of individual glyph forms "parallel letterwise recognition", performed by the human brain's highly-developed shape cognition facility. Text set in lower case is found to be more readable, presumably because lower case letter structures and word shapes are more distinctive, having greater saliency with the presence of extenders ascenders, descenders and other projecting parts. Readers' cognize the upper portions of letters more than the lower portions in the recognition process. Capital letters by comparison are of uniform height and less varied in structure; this the

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generally accepted reason that all-capitals text is found to be less readable in tests of extended reading, causing slower reading speed and less comprehension.

Readability is compromised by letterspacing, word spacing and leading that are too tight or too loose. Generous vertical space separates lines of text, making it easier for the eye to distinguish one line from the next or previous line. Poorly designed fonts and those that are too tightly or loosely fitted can also result in poor readability.

Some typographers believe that another factor, the Bouma or overall word shape, is also very important in readability, and that parallel letterwise recognition is either wrong, less important, or not the entire picture. Studies that distinguish between the two models have favored parallel letterwise recognition, and the latter is widely accepted by cognitive psychologists.

Legibility is the ease and speed with which the reader can decipher each letterform and word. This is determined by the design of individual characters and how clearly they are rendered. Legibility can be affected by choice of ink and paper colors.



Popular American newspapers like *USA Today* use typography heavily.

Typography is used in all newspapers, magazines and periodicals. Headlines are often set in larger type to attract attention and are placed near the masthead. For example, **USA Today** uses a bold, colourful and comparatively modern style through their use of different fonts and colors; type sizes vary widely, and the

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newspaper name is placed on a coloured background. In contrast, New York Times uses a more traditional approach with fewer colors, less font variation and more columns. Generally, every magazine, newspaper and periodical standardizes on a small collection of typefaces fonts to aid in the navigation of its content, to create a sense of familiarity, or create dramatic effects. Some publications such as The Guardian and The Economist, commission bespoke typefaces from a type designer, a specialist typographer who designs typefaces.

Display typography



19th century poster printed with wood and metal types.

Typography is a potent element in graphic design, where there is less concern for readability and more potential for using type in an artistic manner. Type is combined with negative space, graphic elements and pictures, forming relationships and dialog between words and images.

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Color and size of type elements are much more prevalent than in text typography. Most display typography exploits type at larger sizes, where the details of letter design are magnified. Color is used for its emotional effect in conveying the tone and nature of subject matter.

Display typography encompasses posters; book covers; typographic logos and wordmarks; billboards; packaging; on-product typography; calligraphy; graffiti; inscriptional & architectural lettering; poster design and other large scale lettering signage; business communications & promotional collateral; advertising; word marks & typographic logos logotypes, and kinetic typography in motion pictures and television; vending machine displays; online & computer screen displays.

The wanted poster for the assassins of Abraham Lincoln was printed with lead and woodcut type, and incorporates photography.

Advertising



A print advertisement from a 1913 issue of National Geographic

Typography has long been a vital part of promotional material and advertising. Designers often use typography to set a theme and mood in an advertisement; for example using bold, large text to convey a particular message to the reader. Type is often used to draw attention to a particular advertisement, combined with efficient use of color, shapes and images. Today, typography in advertising often reflects a company's brand. Fonts used in advertisements convey different messages to the reader; classical fonts are for a strong personality, while more modern fonts are for a cleaner, neutral look. Bold fonts are used for making statements and attracting attention.



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Inscriptional & architectural lettering

The history of inscriptional lettering is intimately tied to the history of writing, the evolution of letterforms, and the craft of the hand. The widespread use of the computer and various etching and sandblasting techniques today has made the hand carved monument a rarity, and the number of lettercarvers left in the States continues to dwindle.

For monumental lettering to be effective it must be considered carefully in its context. Proportions of letters need to be altered as their size and distance from the viewer increases. An expert letterer gains understanding of these nuances through much practice and observation of their craft. Letters drawn by hand and for a specific project have the possibility of being richly specific and profoundly beautiful in the hand of a master. Each can also take up to an hour to carve, so it is no wonder that the automated sandblasting process has become the industry standard.

In typography, **serifs** are non-structural details on the ends of some of the strokes that make up letters and symbols. A font that has serifs is called a *serif font* or *seriffed* font. A font without serifs is called sans-serif, from the French *sans*="without". Some typography sources refer to sans serif typefaces as "grotesque" in German "grotesk" or " gothic", and serif types as "roman". These terms are no longer commonly used however, except in specific font names.

Uses and Advantages of Different Printing Processes

- Books and newspapers are printed today using the technique of offset lithography. Other common techniques include flexography used for packaging, labels, newspapers
- Screen printing from T-shirts to floor tiles, Screen printing, or serigraphy, previously known as Silk screening is a printmaking technique that traditionally creates a sharp-edged image using a stencil and a porous fabric. A screen print or serigraph is an image created using this technique.
- Pop Art is currently popular both in fine arts and in commercial printing, where it is commonly used to put images on T-shirts, hats, CDs, DVDs, ceramics, glass, polyethylene, polypropylene, paper, metals, and wood.
- In electronics, the term screen printing or screen printing legend often refers to the writing on a printed circuit board. Screen printing may also be used in the process of etching the copper wiring on the board or computer chips.



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- Graphic screen printing is widely used today to create many mass or large batch produced graphics, such as posters or display stands. Full color prints can be created by printing in CMYK Cyan, Magenta, Yellow and Black.
- Screen printing is often preferred over other processes such as dye sublimation or inkjet printing because of its low cost and ability to print on many media.
- Rotogravure is mainly used for magazines and packaging. In 1932 a George Gallup "Survey of Reader Interest in Various Sections of Sunday Newspapers to Determine the Relative Value of Rotogravure as an Advertising Medium" found that rotogravures were the most widely read sections of the paper and that advertisements there were three times more likely to be seen by readers than in any other section. The rotogravure process is still used for commercial printing of magazines, postcards, and corrugated cardboard product 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
- Inkjet printers are a type of computer printer that operates by propelling tiny droplets of liquid ink onto paper. They are the most common type of computer printer for the general consumer due to their low cost, high quality of output, capability of printing in vivid color, and ease of use.
- 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. Like photocopiers, 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.



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1.8. PAPER FOR PRINTING



The more you know about the characteristics of paper, the better able you will be to save money when specifying paper for your printing jobs. In fact, if you specify the qualities you require in your paper, rather than a specific name brand, your printer may be able to offer several acceptable options.

Each paper stock possesses the following characteristics:

- 1. Surface texture-** Uncoated and coated paper has different surface textures. In the papermaking process, uncoated stock has been compressed between metal rollers calendared only to a limited degree, yielding vellum, antique, wove, and smooth surfaces from rough to smooth, depending on the amount of calendaring. Coated paper varies from roughest matte) to smoother dull to smoothest gloss, also depending on the amount of calendaring. Papermaking machines can even impress such textures as "linen" and "canvas" on paper. The smoother the paper, the better the "holdout" the better the ink sits up on the surface of the paper rather than being absorbed into the fibers.
- 2. Brightness-** Brightness refers to the amount of light a sheet reflects 0 to 100 percent, with a crisp white sheet often exceeding 90 percent.
- 3. Color-** Paper color is tricky. It changes the color of the ink, so always request printed samples. Colored stock is also more expensive than white stock because of the dyes used and because it is less in demand. Off-whites, referred to as cream, ivory, etc., are a good option for some jobs, but the names differ from paper mill to paper mill, and the appearance will change among paper batches produced at different times. The color of the paper and whether it has a high or a low glare, are other important qualities to take into



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consideration. Some coated papers now have a low glare, which makes for easier reading.

4. **Whiteness if you specify a white sheet** - Whiteness refers to the color of the reflected light either yellow -white or blue-white, i.e., warm or cool. Brightness and whiteness affect readability too much light tires your eyes when reading long blocks of text and the crispness of photos too little light reflected back makes photos seem dark or muddy.
5. **Opacity-** Opacity determines show-through. A sheet with high opacity will prevent solids, screens, and halftones from being visible through the opposite side of the sheet, which could otherwise be quite distracting. Colored sheets are usually more opaque than white sheets. This quality is rated on a 1 to 100 scale. Most sheets fall in the 80 to high 90 range.
6. **Grain direction-** Grain direction refers to the direction the fibers of a sheet have aligned during the papermaking process. In grain long papers, the fibers run parallel to the length of the sheet. In grain short paper the opposite is true. Paper folds better parallel to the grain direction, but are stronger against the grain. Also, paper can expand against the grain when exposed to a press' dampening solution or moisture in the air. Therefore, to maintain tight register a job on this paper would be run grain long.
7. **Weight & Size** - Weight is based on the size of 500 sheets a ream of paper. A ream of 80# cover, measured at 20" x 26", weighs 80 pounds. The same paper in text weight still weighs 80 pounds but the sheet size is different: 25" x 38". It is therefore a thinner sheet. Of course these sheets can be cut to a smaller size. This is just a convention for precisely describing different grades of paper, such as bond, offset, etc. Another scale is in points thousandths of an inch. You might, for instance, specify a cover for a perfect-bound book as a 10 pt. sheet. To be safe, always ask for samples.
8. **Bulk-** Lower bulk reduces opacity. Higher bulk will increase the overall thickness of a book. Therefore, it helps to know a paper's measure in pages per inch caliper).
9. **Caliper-** Caliper is the thickness of paper when measured with a micrometer. It is related to bulk, which is a relative measure of the thickness as related to the basis weight of a sheet.

All of these qualities affect the run ability and printability of the paper, as well as its appearance, so listen to your printer's advice. However, don't hesitate to request samples, both printed and unprinted, of any sheet suggested by your printer. Only



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by actually seeing a printed sheet can you know whether a particular paper will work for your own job.

1.9. TYPE COLOR

Type color is a typographic term referring to the weight or boldness or lack of boldness of a font. It is such called because type color affects the amount of black on the page. "**Black**" fonts are bold and heavy.

The term 'type colour' should not be confused with our usual meaning of colour i.e. red, yellow, blue, etc; it is rather the term used by designers and typographers to describe the visual tone of a mass of text on a page. In essence it refers to the overall balance of type to white space.

Type colour is affected by a number of elements including font weight light/regular/bold, letter spacing normal/condensed, and line space leading.

In typography, a **typeface** is a coordinated set of glyphs designed with stylistic unity. A typeface usually comprises an alphabet of letters, numerals, and punctuation marks; it may also include ideograms and symbols, or consist entirely of them, for example, mathematical or map-making symbols. The term *typeface* is often conflated with *font*, a term which, historically, had a number of distinct meanings before the advent of desktop publishing; these terms are now effectively synonymous when discussing digital typography. A helpful and still valid distinction between font and typeface is a font's status as a discrete commodity with legal restrictions, while typeface designates a visual appearance or style not immediately reducible to any one foundry's production or proprietary control.

The art and craft of designing typefaces is called *type design*. Designers of typefaces are called *type designers*, and often *typographers*. In digital typography, type designers are also known as *font developers* or *font designers*.

The size of typefaces and fonts is traditionally measured in points; *point* has been defined differently at different times, but now the most popular is the Desktop Publishing Point. Font size is also commonly measured in millimeters mm and inches.

1.10. TYPE DESIGN

Type design is the art of designing typefaces. Although the technology of printing text using movable type was invented in China, and despite the esteem which



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calligraphy held in that civilization, the vast number of Chinese characters meant that few distinctive, complete fonts could be afforded by Chinese printers. The applied art of designing pieces of type thus became primarily a Western practice whose market increased with the coming of mass advertisement and steam-powered printing in the nineteenth century. With the advent of desktop publishing and internet web pages, which use different technologies, the marketplace has demanded ever more varied typefaces merely for the purposes of variety to get the customers' attention. Finally, the ease of this new technology has resulted in the hobby or money-saving option of amateur type design.

Font, typeface and type family

A font is a set of glyphs images representing the characters from a particular character set in a particular typeface. In professional typography the term *typeface* is not interchangeable with the word *font*, which is defined as a given alphabet and its associated characters in a *single* size. For example, 8-point Caslon is one font and 10-point Caslon is another. Historically, fonts came in specific sizes determining the size of characters, and in quantities of *sorts* or number of each letter provided. The design of characters in a font took into account all these factors.

As the range of typeface designs increased and requirements of publishers broadened over the centuries, fonts of specific weight blackness or lightness and stylistic variants—most commonly *regular* or *roman* as distinct to *italic*, as well as *condensed* — have led to *font families*, collections of closely-related typeface designs that can include hundreds of styles. A font family is typically a group of related fonts which vary only in weight, orientation, width, etc, but not design. For example, Times is a font family, whereas Times Roman, Times Italic and Times Bold are individual fonts making up the Times family. Font families typically include several fonts, though some, such as Helvetica, may consist of dozens of fonts. Helvetica, Century Schoolbook, and Courier are examples of three widely distributed typefaces.

Quad in typography, a space that is as wide as the height of the font. It is a unit of measurement in the field of typography, equal to the pt size of the current font. This unit is not defined in terms of any specific typeface, and thus is the same for all fonts at a given point size. So, 1 em in a 16 pt type face is 16 points. This length is also called a **firet**.



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Since the first recordings of letterforms the concept of the typographic form has evolved into a seemingly endless variety of designs. Type design variations fall within specific categories.

The basic category of type design is the **typeface: the specific letterform design of an alphabet**, including the serif shape, x-height, length of ascenders and descenders, variation of stroke weight, and any other characteristics that differentiate it from any other design. Each typeface is known by a name, such as Helvetica, Bodoni, and Times Roman, and there may be several interpretations of a typeface such as Century Schoolbook, New Century Schoolbook, and Century Oldstyle. The term typeface, as with much contemporary type terminology, originates with movable type, blocks of wood or metal containing a relief image of a character on one surface, called the **face**.

Times Helvetica
Benguiat Optima
Lubalin Graph

Typefaces are character sets based on distinct design characteristics.

1.11 Typestyle

A typeface usually includes several **design variations** called **styles**. The available number of typestyles, which varies among typefaces, is based on the following visual characteristics:

Roman *Italic* **Bold** *Bold Italic*

Standard type styles

Character angle: The fundamental typestyles are **Roman**, the standard vertical style, and **italic**, which is angled. Italic typestyles are cursive, unique letterform variations based on handwriting, or **oblique**, angled versions of the Roman style. Cursive italics are usually limited to serif designs.



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Cursive Italic

Serif typefaces have true cursive italic styles with re-designed characters.

Oblique Italic

Sans serif typefaces have oblique italic styles in which the Roman characters are angled

Character weight: Most typefaces contain bold and bold italic tpestyles which are much heavier in stroke weight than the Roman. Many typefaces offer a broader range of weights in addition to Roman, including light and medium or book and in addition to bold, including semi bold or demi bold, extrabold or heavy, and black.

Light **Bold Heavy Black**

Extended styles based on weight

Character width: Some typefaces include tpestyles with character widths which are narrower than roman, called **condensed**, and wider, called **extended**. These tpestyles generally include accompanying weight variations.

Gill Sans Light
Gill Sans Light Italic
Gill Sans Regular
Gill Sans Italic
Gill Sans Bold
Gill Sans Bold Italic
Gill Sans Extra Bold
Gill Sans Ultra Bold
Gill Sans Condensed
Gill Sans Bold Condensed
Gill Sans Ultra Bold Condensed

Styles included in the Gill Sans family.

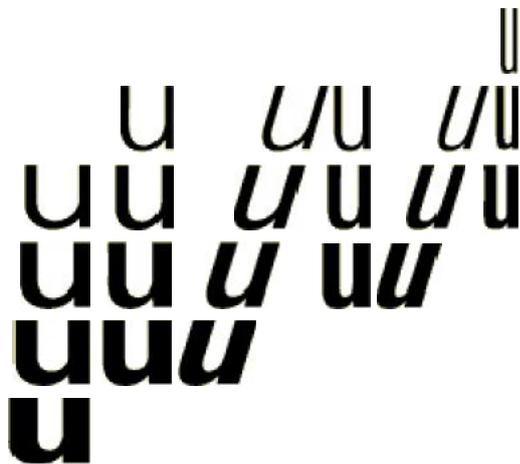
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Font

A collection of all the characters of a typeface in one size and one style is called a font. This includes caps and lowercase, numerals, punctuation marks, and any special characters contained in the typeface, such as symbols or ligatures. The precise meaning of the term font is changing with the times. Originally, a font was a collection of pieces of wood or metal type. They were a specific size and, therefore, could only print one size character. Modern typesetting technology can reproduce almost any size character from one digital font. Therefore, the terms font and typeface, while distinct from one another, are often used interchangeably.

Type Family

The complete assembly of all the sizes and styles of a typeface forms a type family, bearing the name of its typeface. For example, all the styles and sizes of Helvetica form the Helvetica family. A type family may contain many variations in fact, the Helvetica family currently contains more than 60 typefaces and styles, but will always retain a strong visual continuity because all of the variations are based on common design characteristics. This allows the designer to present some visual variety on a page while maintaining a strong unified appearance.



The Universe family was designed with an extended range of 21 styles.

The concept of the type family is explored to fullest extent by Sumner Stone in his unique family of typefaces, designed in the 1980s for the contemporary designer using personal computer technology. The Stone family not only contains typeface variations based on strong design characteristics, but includes complete groups of styles in three different typeface categories. Stone Serif is a traditional thick and



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thin serif face, Stone Sans is a contemporary uniform strike sans serif face, and Stone Informal is a graceful, contemporary rounded serif typeface. The Stone family was designed, in part to address the new user of typography, that is, the desktop publisher who produces typeset documents without an extensive background in typography and/or design. The Stone family, while running the gamut in typestyle variations, has a strong visual consistency based on common typographic design characteristics. Thus one can more safely combine many different typefaces and styles without worrying about visually incompatible images.

Stone Serif Regular	Stone Sans Regular	Stone Informal Regular
<i>Stone Serif Italic</i>	<i>Stone Sans Italic</i>	<i>Stone Informal Italic</i>
Stone Serif Semibold	Stone Sans Semibold	Stone Informal Semibold
<i>Stone Serif Semibold Italic</i>	<i>Stone Sans Semibold Italic</i>	<i>Stone Informal Semibold Italic</i>
Stone Serif Bold	Stone Sans Bold	Stone Informal Bold
<i>Stone Serif Bold Italic</i>	<i>Stone Sans Bold Italic</i>	<i>Stone Informal Bold Italic</i>

The Stone family was designed with 3 typefaces and 18 typestyles.

Type Measurements

The demands of good design, readability and legibility, especially with large amounts of text, requires attention to the size of type, the length of the typeset line or column width and the space between characters, words, lines and paragraphs.

There are three basic units of measurement used in working with type: **points**, **picas**, and **ems**.

Point, pica and inch conversions are as follows:

- One point = 1/72 of an inch
- One pica = 12 points
- One inch = six picas or 72 points

Points

Points are used to measure height, such as the type size height of the character and the space between lines and paragraphs.

The **point size** of type is the height in points **measured from the top of the ascender to the bottom of the descender** plus a variable amount of space above and below to keep typeset lines from touching.

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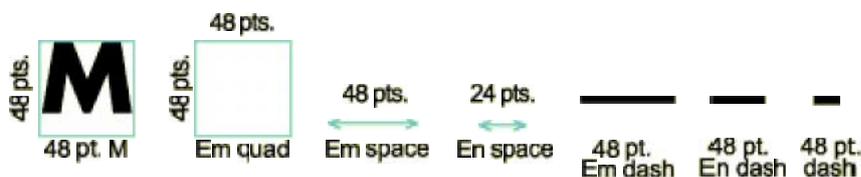
Type size is measured in points from the top of the ascender to the bottom of the descender.

Picas

Picas are used to **measure width**, such as the width of a typeset column length of line) or the space between columns. Picas are more convenient than inches because smaller spaces can be measured in whole units instead of fractions.

Ems and ens

The **em space** is based on the **em quad**, which is the **square of the type size**. For example, the em quad of 48pt. Futura is 48 pts. high by 48 pts. wide. The em space measures 48 points.



An em space is always equal to the point size of the type being measured.

It is a particularly useful type measurement because, instead of being static like points and picas, it changes in proportion to the size of type used. It is primarily used to control space between characters and words, and the space of special characters such as the long dash — or em-dash. The **en** is **half of the em** and the width of the en-dash.

Importance of Typography

Typesetting is the composition of text material by means of types. Typesetting requires the prior process of designing a font and storing it in some manner. Typesetting is the retrieval of the stored letters called sorts in mechanical systems and glyphs in digital systems and the ordering of them according to a language's orthography for visual display.



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For an editor or reporters of an English newspaper there are only twenty six alphabets with only two symbols each-one as a capital letter and the other in its small form, for the page make-up, the choices are almost unlimited. Today with the help of computers one can develop new typefaces by incorporating variations in size, form and shape of each letter. It is the size, form and shape that determine and distinguish the typeface of a letter.

For a page layout designer, letters become a visual framework that gives readers their first overall impression of a printed page. A page designer must select type of analyzing its visual appearance as well as readability of its typeface. While the choices may be many, editors of daily newspapers for the sake of economy, workability and convenience to its readers, make deliberate attempt to limit the variations of typefaces used in their page make-up. Many newspapers adopt just one typeface in different sizes throughout the newspaper. However, magazines and advertiser tend to experiment with typography to give their pages and messages an eye-catching quality.

1.12. TRADITIONAL PRINTING VS MODERN TYPOGRAPHY

Like everything else around us, typography is an evolving science based on experiments with few successes and many failures. If you take a look at an old book, of any language or script, published about forty or fifty years ago, you will notice that the size, shape and style of the type faces used is very different from the ones that are in use today for similar publications. Many major improvements have come about due to technological innovations, competition between publications and other media, as well as changes in reading habits.

As in other cases, technology tends to standardize products and services. The need for mass production gives rise to the need to define-‘the preferences or expectations of the average reader’. The average reader is assumed to represent the majority of readers. It is the average reader that editors have as a backdrop while selecting editorial matter or while page make-up departments design the pages of their publications. The needs, requirements and expectations of average readers keep changing. Along with these changes are the developments in composing and printing which give rise to changes in the use of typography.

Hot and Cold Type: as the name suggests-hot type refers to machine-set type, a method, which involves casting type from molten metal. It has three main variations:

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- **Handset**-in this, the composer holds the composing stick in one hand and picks individual letters from a type case with the other. Whenever he wants to insert space he simply inserts strips called leads between lines. The handset method of setting type is time consuming and is obviously not a practical or economic alternative for most newspapers.
- **Linotype**-the term linotype gives appropriate description for the machine that casts hot lines of type. In this case an operator sits at a keyboard and the machine is adjusted to set type and to a specific leading spacing between line). When the operator strikes the keys, the matrices a letter mold falls into place, forming a line of type. When the operator is ready to case a line, he pulls a level, which among other things; forces molten metal into the matrices and the line of type is ejected, into a pan.
- **Monotype**-as it name implies, the monotype casts characters one by one rather than as a complete line. It is normally designed for casting type from twelve to seventy two points-mainly for news headlines or advertisement matter.

Linotype vs. Monotype

The **Linotype typesetting machine** is a "line casting" machine used in printing. The machine revolutionized typesetting and with it especially newspaper publishing, making it possible for a relatively small number of operators to set type for many pages on a daily basis.





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A Linotype keyboard: *Keys are arranged by order of frequency as they appear in the English language*

The Linotype machine operator enters text on a 90-character keyboard. The machine assembles *matrices*, which are molds for the letter forms, to a line. The assembled line is then cast as a single piece, called a *slug*, of type metal in a process known as "hot metal" typesetting. The matrices are then returned to the type magazine from which they came. This allows much faster typesetting and composition than original hand composition in which operators place down one pre-cast metal letter, punctuation mark or space at a time. – The name of the machine comes from the fact that it produces an entire line of metal type at once, hence a *line-o-type*.

Monotyping is a type of printmaking made by drawing or painting on a smooth, non-absorbent surface. The surface, or matrix, was historically a copper etching plate, but in contemporary work it can vary from zinc or glass to acrylic glass. The image is then transferred onto a sheet of paper by pressing the two together, usually using a printing-press. Monotypes can also be created by inking an entire surface and then, using brushes or rags, removing ink to create a subtractive image, e.g. creating lights from a field of opaque color. The inks used may be oil based or water based. With oil based inks, the paper may be dry, in which case the image has more contrast, or the paper may be damp, in which case the image has a 10 percent greater range of tones.

Unlike mono printing, mono typing produces a unique print, or monotype, because most of the ink is removed during the initial pressing. Although subsequent re printings are sometimes possible, they differ greatly from the first print and are generally considered inferior. A second print from the original plate is called a "ghost print" or "cognate". Stencils, watercolor, solvents, brushes, and other tools are often used to embellish a monotype print. Monotypes are often spontaneously executed and with no previous sketch.

Hot type is associated with letterpress printing process. Letterpress is synonymous with relief printing, because the area to be printed is raised. When the surface is inked, the area to be printed receives ink but the surrounding area, because it is lower, receives no ink and thus does not print.

Cold type- with the advent of offset lithography printing process, slowly hot type gave way to cold type. Just as hot type is associated with letterpress printing process, cold type is with offset printing process.



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Phototypesetting- it is also known as photocomposition. The letters can be imprinted directly on photosensitized films of paper. Many different systems are available to newspapers and magazines today, but the basic steps of production are likely to be the same. Typically, most phototypesetting systems are made up of a keyboard for input, a computer for processing and executing such action as justifying copy and allowing for leading space, and an output unit for paper for film reproduction.

Comparatively, cold type is cheaper than hot type, and cleaner. Also because everything that can be photographed can be reproduced in this system, it offers greater design possibilities and greater choice of typefaces.

With the popularity of phototypesetting and offset printing, newspapers have a wider choice in matching and contrasting of type faces. You may notice that some newspapers use one bold type face of one 'family' for the headlines and type face of another family, usually of smaller size for sub heading. This is a common practice of magazine page designer.

In page layout, when we want to emphasize or highlight a word, an expression, a sentence, a paragraph or even a portion of the news item we have many options before us. Some of the common practices are:

- Use of different type form of the letters such as italics
- Use of bolder type face for the word or portion of the news item to be emphasized
- Underlining the word or sentences

Though the newspapers and magazines we read today have gone through several stages of developments, more changes are taking place as new techniques and technologies are introduced.

To understand present day trends in typography, one must consider the beginnings of printing from movable type and the historic background of letterforms used in printing. Books printed prior to 1500 were called **incunabula, or cradle books**. These early volumes were indeed the cradles of the books of today. The first type designers were required, by the very meagerness of their means, to make the best possible use of the tools and devices at their disposal. **A single artisan often combined the several skills of designing, matrix cutting, type molding, ink**



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mixing, papermaking, composition and presswork. The results achieved were of such quality that only comparatively recent printing has even approximated the beauty and legibility of the early books. The books of Gutenberg's era were well adapted to the reading habits of that time. **The transition from hand writing to books printed from movable types was easy and natural.**

So closely did the type designers follow the models of the calligraphers that copies of the first Psalter from Gutenberg's press were sold in Paris by Peter Schoeffer as hand-written books.

While printing presses had long been in use for reproducing images cut in wood and metal, it was the invention of movable type about 1456 that made possible the expansion of bookmaking to the amazing proportions that it has now reached. The symmetrical arrangement of the title page of early books reflected the neat, categorical order of the economic and political structures of the feudal era. For centuries little consideration was given to the dynamic possibilities of white space and its functional use. Coeval with the industrial revolution that followed the gradual replacement of handicraft with machine production, there was wide experimentation with type design and the arrangement of type on the page. In the attempt to break from tradition, hundreds of new type designs found their way to the type-founders catalogs, with some weird and impractical results. Only a few of this multitude of designs have survived the test of time. The growth of advertising has made great demands upon the ingenuity and versatility of craftsmen in the graphic arts.

Photoengraving and other illustration techniques have kept pace with the improvement in machinery and reproduction processes. The growing use of offset photolithography and the combining of commercial art with typography in the making of zinc line cuts for letter presses, have greatly increased the scope and variety of typographic arrangements.

By these methods, type may be photographed in any desired shape and at any angle. The stiff and formal arrangement of type *in* symmetrical balance does not meet the requirements of competitive selling by visual means. Newer techniques of color and form are supplanting the formal, ordered methods of a slower-paced, more leisurely time. The white space of the page, heretofore considered as a mere frame for type and illustration groups, is now employed as an active element in composition. A new type of balance is sought, based upon asymmetrical, informal arrangements.



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The sans serif types are admirably suited to modern ideas and methods. The wide range of weight, from light to ultra bold, with oblique variations, meets the demands of the time for printing based upon function rather than tradition. Four principal basic type designs are now in general use.

The serif, or cross stroke at the top and bottom of the letter, is the distinguishing mark of the three traditional type designs.

The most widely used contemporary design is entirely devoid of serifs.

These four main classes of type are as follows:

1. **OLD STYLE**, derived from Roman letters cut in stone. The serif of the old style letters was originally formed by the chisel—a line straight across, rounded by the chisel stroke connecting the serif line with the body of the letter.
2. **MODERN**, with a thin straight line for serif—a development of lettering made with an engravers tool in copper and steel.
3. **SQUARE SERIF**, the characteristic of which is the straight thick line used in making the serif—a more recent adaptation of old style and modern letters.
4. **SANS SERIF**—formed with lines of approximately even thickness and having no serifs. Several other type designs, not so widely used as the four enumerated, are shown in the accompanying illustration.

Some of the old styles letters now in general use are Garamond. Cloister, Burkesville, Carlson, Weiss, Centaur and Kennerly. As old style is most generally used in newspapers and books, and the eye of the average reader is most familiar with it, it is considered the most legible of the traditional type faces. The slight irregularities in the forming of the individual letters and the variation in the height of the lower case lends to this type a certain grace that is pleasing to the eye, and aids in the formation of distinctive word patterns.

The so-called modern letters with their straight, thin serifs and rather formal regularity of shape are probably less legible than the *old style* forms. Bodoni, named for an early Italian printer, is the most popular of this class.

Sans serif is probably more widely used in advertising than any other style of type, and its use is gradually extending to pamphlet and book printing. Because of its simplicity, the even weight of its *lines*, and its *nicely* balanced proportions, sans serif forms pleasing and easily distinguished word patterns—a most important element in legibility and easy reading, A prevalent notion that sans serif is not as



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readable as old style is based upon its comparative newness and not upon any innate structural defect.

Printing can attain its own individual beauty, with which handwriting can never compete, only when it ceases seeing its prototype in handwriting. The letter of our time must finally accept the consequences resulting from the invention of type cutting and casting. We must ultimately familiarize ourselves with the idea that printing from type has nothing whatever to do with handwriting. It is an impression from metal letters: symbols that form themselves into word images. The reading eye does not follow the continuity of a type design but grasps, bird's-eye-like, groups of word images mirrored on the paper.

The most significant tendency in modern typography is a trend toward the functional employment of type, rather than its use based upon tradition. **The asymmetrical arrangement of lines and groups of type in relation to the white space available to the typographer, offers an opportunity to achieve dynamic and interesting effects.** While the advertising profession has made the widest use of the new methods and concepts in the graphic arts, book printers have for the most part followed the old traditional ways.

There is noticeable in some recent books, however, an acceptance of some of the principles of visual communication already acknowledged in the advertising field. The trend in modern typography is definitely toward simplicity and legibility, employing forms that comply with the natural inclination of the human eye to seek harmony and ease.

Headline Typography

How a publication or advertisement is designed tells us a lot about its target audience and about the image, which it is trying to project. For example, in Britain newspapers are generally divided into 'quality' broadsheets and 'popular' tabloids, according to their page size. The cover of the political magazine *Prospect* uses a cool, formal design, while teenage girls' magazines such as *Mizz* use much more colour and informal typography.

The key elements of page design are **colour, size, type style and shape.**

Typefaces: The shape of the letters in which text is typeset can make a big difference to the image, which is conveyed. Typefaces fall into one of three main categories: *serif, sans serif and decorative.*



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Serifs are the little tabs on the corners of the letters. *Sans-serif* typefaces like Helvetica do not have these: they appear plainer, and can be designed in bolder versions than serif typefaces.

Generally, serif typefaces are more 'traditional' and authoritative, while sans serif faces have a more modern or technological feel. In a broadsheet, a bold serif type like Times Bold may be used for headlines.

Type style: A tabloid front page may contain many variations in type style. The headline will usually be typeset in a *bold, condensed, sans-serif* type. **It may be 'reversed out' - printed as white type on a black background.**

Bold means that the letters are made up of thicker strokes lines than normal, so the typeface looks blacker.

Condensed means that the letters are tall and narrow, allowing more of them to be fitted onto a line at a given size.

Oblique refers to slanted type, usually sans-serif; slanted serif type is usually called *Italic*.

The body - the main text of the story - will usually be set in a serif type because it's easier to read at small sizes; the *subheads* or *cross-heads* between sections of the story may be in either serif or sans-serif type.

The style of type used in the **masthead** - the newspaper's logo - will usually tell us a lot about the image, which the newspaper is trying to project. The *Sun* and the *Mirror* are sometimes called 'redtops' in the trade to distinguish them from middlebrow tabloids like the *Express* and *Mail*.

The Grid: Almost all publications are designed on a grid. This is a background with columns on it, into which the type is placed. Headlines, photographs and the boxes containing stories can be run across several columns. Newspapers, particularly tabloids, vary the grid from page to page, or even have different grids for the top and bottom half of the page, or columns of different width on the same page.

Type Alignment: Within a column, type can be arranged in one of several ways: justified, where both edges of the column line up; centered; ranged left where the left edge of the column is straight and the right is irregular) or ranged right the opposite). The body of the story is usually justified; headlines may be justified,

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centered or ranged left. A broadsheet may use different alignments for different sections of the paper.

Rules: Rules are what designers call straight lines: a '10pt rule' is a straight line ten points thick a point is 1/72 of an inch. Rules are used above and below stories, or to separate columns; they can also be use as boxes around stories. A tabloid will probably use thicker and more obvious rules than a broadsheet.

News stories: Stories are organized methodically. In a tabloid, the main news story may occupy several times the space of the second story. Type size will be used to differentiate between the main headline, the *strap line*, and the main text of the article. Readers will be led steadily into the story. In both tabloid and broadsheet newspapers, stories will usually fit into a square or rectangle, with any surplus being carried over to another page. A '**jump line**' tells the reader which page to turn to.

Pictures: Tabloids will usually have a large picture on the front page. If there is another picture, it will often be very small: so that the main picture looks larger by comparison. Pictures will usually only be used the same size if they are being directly compared - for example, faces of opposing politicians. Pictures in tabloids will be closely cropped to eliminate any irrelevant information, and captions will be used to ensure that we get the intended meaning. In a broadsheet, more ambiguous or more loosely cropped pictures may be used.

Differentiation: Items on the page can be divided into four categories: general information about the newspaper its name, price, the date and so on; the day's news stories with their accompanying pictures; 'puffs' or 'plugs' promoting what's in the paper, and advertisements, if any. The differences between these kinds of items are usually made very clear:

- A single colour is often used for the *masthead* the newspaper's logo, which will be set in a type style, which does not appear elsewhere on the page.
- *News stories* are usually typeset in black type on a white background; colour will only be used for the photographs. Stories normally occupy squares or rectangles.
- '*Puffs*' are often set in irregular shapes or boxes with rounded corners, and the photos in them may be cut out to extend beyond the border; they may be colourful and contain a variety of text styles. They usually appear at the top of the page, adjacent to the masthead.

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- *Advertisements* will also often be in colour, but will be clearly separated from the other items on the page by a rule or box, and will be well away from the masthead.

Putting it all together: A tabloid front page uses all these techniques to make life easy for the reader. It's obvious which are the puffs and which are the news stories; which is the main news story, and in which order we should read the story. In contrast, a broadsheet will use many of the same techniques but in a less pronounced way, offering readers a choice rather than directing the reader into one story.

Proof reading before Printing

It is essential that all materials are thoroughly proofread to avoid typos or embarrassing blunders before going to print. Proofreading can be tricky, especially if you are the author, designer or are closely involved with the document or project. However a few simple tricks of the trade can mean that all mistakes are quickly identified and corrected.

To begin, use the computer spell checker to eliminate simple typos. Remember to check that the computer has the correct language selected i.e. UK vs. US. Computers do not always get it right though so having a printed dictionary to hand is also useful.

Each subsequent reading of the document should be focused on a different aspect. First, read the document to see if it is complete with all the information needed, this could mean dates and times for an event on a flyer or thorough explanations of services in a brochure, either way make sure it is all there.

Next, read the document to see how it sounds. Listen to the sound of the voice in your head or read out loud to see if the sentences make sense as a whole. The tone and flow of a document are important to ensure the audience remains interested and receives the right impression of the company or promotion.

A third reading can be used to identify other spelling and punctuation mistakes. Before this reading is undertaken it can be helpful to read something else in between to enable the mind to return fresher. A top tip is to read the document backwards when checking for spelling mistakes.



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Finally, check all content outside of the main body of the text or that which is formatted differently such as headers and footers. Often this 'outside' text is additional information such as telephone numbers; dates, company names etc. and these items can be easily overlooked.

At least one of these readings should be done in hard copy as mistakes can be missed on a computer screen.

Here is a list of the most common typographical mistakes:

- Homophones - these are words which sound the same but have a different spelling and meaning. Right and write, deer and dear.
- Leaving out silent letters - Febuary and February, lisen and listen.
- Adding an Ending - mistakes can be made when changing the tense of a word by adding an ending. Hopeing and Hoping or Submiting and Submitting.
- Missing words - most commonly with smaller words, to, it, is, of, a, etc. Or sometimes these words are used incorrectly in exchange for one another.
- Ordering of letters - the most common of typos is for letters to be the wrong way round.
- Punctuation - apostrophes are the most common punctuation mistake. They should be used in two ways, for the possessive e.g. Rama's ball, and to replace missing letters e.g. it's or don't.
- Amalgamating words - some words should be separate 'a lot' rather than 'alot'
- Verbs - adapt the verb to a singular or plural subject for example 'I was' and 'we were' not 'I were' and 'we was'.
- Should of/should have - the latter is correct.

In printing and publishing, **proofs** are the preliminary versions of publications meant for review by authors, editors, and proofreaders. Galley proofs may be uncut and unbound, or in some cases electronic. They are created for proofreading and copyediting purposes, but may be used for promotional and review purposes also.

Galley proofs are so named because in the days of hand-set type, the printer would set the page into galleys, the metal trays into which type was laid and tightened into place. These would be used to print a limited number of copies for editing

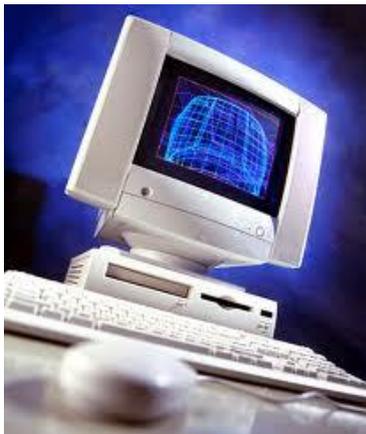
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mark-up. The printer would then receive the edits, re-arrange the type, and print the final copy.

Some publishers use paper galley proofs as advance reading copies, providing them to reviewers, magazines, and libraries in advance of final publication. These proofs are normally bound, but may be lacking illustrations or have them in black and white only. Proofs in electronic form are rarely offered for advance reading.

Proofs issued in the proofreading and copy-editing review phase are called galleys or galley proofs; proofs created in a near-final version for editing and checking purposes are called *page proofs*. In the page-proof stage, mistakes are supposed to have been corrected; to correct a mistake at this stage is expensive, and authors are discouraged from making many changes to page proofs. Page layouts are examined closely in the page proof stage. Page proofs also have the final pagination, which facilitates compiling the index.

1.13. DESKTOP PUBLISHING DTP



Using a personal computer or workstation to produce high-quality printed documents. A desktop publishing system allows you to use different typefaces, specify various margins and justifications, and embed illustrations and graphs directly into the text. The most powerful desktop publishing systems enable you to create illustrations; while less powerful systems let you insert illustrations created by other programs.

As word-processing programs become more and more powerful, the line separating such programs from desktop publishing systems is becoming blurred. In general, though, desktop publishing applications give you more control over typographical characteristics, such as kerning, and provide more support for full-color output.

A particularly important feature of desktop publishing systems is that they enable you to see on the display screen exactly how the document will appear when printed. Systems that support this feature are called *WYSIWYGs* *what you see is what you get* .

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Until recently, hardware costs made desktop publishing systems impractical for most uses. But as the prices of personal computers and printers have fallen, desktop publishing systems have become increasingly popular for producing newsletters, brochures, books, and other documents that formerly required a typesetter.

Once you have produced a document with a desktop publishing system, you can output it directly to a printer or you can produce a PostScript file which you can then take to a service bureau. The service bureau has special machines that convert the PostScript file to film, which can then be used to make plates for offset printing. Offset printing produces higher-quality documents, especially if color is used, but is generally more expensive than laser printing.

Desktop publishing also known as DTP combines a personal computer and page layout software to create publication documents on a computer for either large scale publishing or small scale local economical multifunction peripheral output and distribution. Users create page layouts with text, graphics, photos and other visual elements using software such as QuarkXPress, Adobe InDesign, the free Scribus, Microsoft Publisher, Apple Pages and to some extent any graphics software or word processor that combines editable text with images. For small jobs a few copies of a publication might be printed on a local printer. For larger jobs a computer file can be sent to a vendor for high-volume printing.

The term "desktop publishing" is commonly used to describe page layout skills. However, the skills and software are not limited to paper and books. The same



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skills and software are often used to create graphics for point of sale displays, promotional items, trade show exhibits, retail package designs, and outdoor signs.

Often considered a primary skill, increased accessibility to more user-friendly DTP software has made DTP a secondary skill to art direction, graphic design, multimedia development, marketing communications, administrative careers and advanced high school literacy in thriving economies. DTP skill levels range from what may be learned in a few hours e.g. learning how to put clip art in a word processor) to what requires a college education and years of experience e.g. advertising agency positions. The discipline of DTP skills range from technical skills such as prepress production and programming to creative skills such as communication design and graphic image development.

By the standards of today, early desktop publishing was a primitive affair. Users of the PageMaker-LaserWriter-Macintosh 512K system endured frequent software crashes, the inability to control letter spacing, kerning the addition or removal of space between individual characters in a piece of typeset text to improve its appearance or alter its fit and other typographic features, and discrepancies between the screen display and printed output. However, for that moment in time, it was received with considerable acclaim.

A page is a prefixed size of virtual printing material which can be viewed on the monitor. Each page has full size and printable area. They are separated with margin guides. In most cases, the full size of page are set to international standard Paper Size sizes ie. 'A4', 'Letter' etc.

There are three main types of components to be laid out on a page. They are Text, Natural or Scanned Images, Artificial or Creative Images. Layout is the process by which the printing components are laid on the page aesthetically and precisely.

While desktop publishing software still provides extensive features necessary for print publishing, modern word processors now have publishing capabilities beyond those of many older DTP applications, blurring the line between word processing and desktop publishing.

In the early days of graphical user interfaces, DTP software was in a class of its own when compared to the fairly spartan word processing applications of the time. Programs such as WordPerfect and WordStar were still mainly text-based and offered little in the way of page layout, other than perhaps margins and line

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spacing. On the other hand, word processing software was necessary for features like indexing and spell checking, features that are today taken for granted.

As computers and operating systems have become more powerful, vendors have sought to provide users with a single application platform that can meet all needs.

The newspaper composing and printing methods have gone through major changes during the past few decades. However, **the basic functions remain the same, to convert the printing matter into printable format.**

Scanner and Image Setter

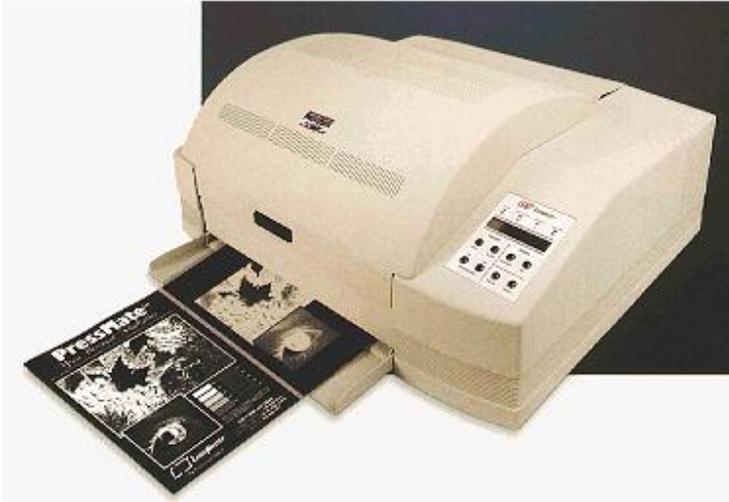


In computing, an **image scanner**—often abbreviated to just **scanner**— is a device that optically scans images, printed text, handwriting, or an object, and converts it to a digital image. Common examples found in offices are variations of the *desktop* or *flatbed scanner* where the document is placed on a glass window for scanning. *Hand-held scanners*, where the device is moved by hand, have evolved from text scanning "wands" to 3D scanners used for industrial

design, reverse engineering, test and measurement, orthotics, gaming and other applications. Mechanically driven scanners that move the document are typically used for large-format documents, where a flatbed design would be impractical.

Modern scanners typically use a charge-coupled device (CCD or a Contact Image Sensor (CIS)) as the image sensor, whereas older *drum scanners* use a photomultiplier tube as the image sensor. A *rotary scanner*, used for high-speed document scanning, is another type of drum scanner, using a CCD array instead of a photomultiplier. Other types of scanners are planetary scanners, which take photographs of books and documents, and 3D scanners, for producing three-dimensional models of objects.

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An **image setter** is an ultra-high resolution large-format computer output device. It exposes rolls or sheets of either photographic film or bromide paper to a laser light source. Once the film or paper is developed, a very high quality black and white image is revealed. Development processing usually occurs in a unit separate to the image setter, as does raster image

processing.

Image setter output ranges in width; usually between 12 and 44 inches. The resolution of an image setter is typically between 1200 and 4800 dpi. The image setter has been largely superseded by the plate setter.

Image setter film is a silver halide-coated plastic film very similar to normal black & white photographic film, except the spectral sensitivity is reduced to a much narrower band around the output of the laser of the individual image setter. This allows the film to be handled under a usually red safelight, instead of in total darkness like most photographic film.



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1.14. SUMMARY

Printing is a process for production of texts and images, 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. **The art and science of making a large number of duplicate reproductions of an original copy is termed as printing.** It may be defined as the art of preserving all other arts. Printing is the medium for printed communication.

Four Important Periods in the History of the Book

- I. 7th to 13th Century: The age of religious "manuscript" book production. Books in this period are entirely constructed by hand, and are largely religious texts whose creation is meant as an act of worship.
- II. 13th to 15th Century: The secularization of book production. Books are beginning to be produced that do not serve as objects of worship, but that try to explain something about the observable world. The difficulty with the spread of such knowledge is that production is still taking place via pre-print - manuscript - methods.
- III. 15th to 16th Century: The first printed books. These are print versions of traditional works like the Bible, books of hours prayer books and the religious calendars.
- IV. 16th to 17th Century: New information is put into books that have important consequences for European life and society.

There are types of printing processes:

1. Offset Lithography the most common printing process today the workhorse! It offsets ink from metal plates to a rubber blanket cylinder) to the paper. Almost every commercial printer does offset printing.
2. Engraving think "fine stationery." Produces the sharpest image of all. Image feels indented run your fingers over the back side of the sheet. Most law firms still use engraving.
3. Thermograph raised printing, less expensive than engraving. Uses special powder that's adhered to any color ink. Mainly used for stationery products.
4. Reprographics general term covering copying and duplicating. Think in-house copying departments and copy or quick-printing shops. They take your originals and make duplicates of them.
5. Digital Printing the newest printing process and the least understood! Includes all processes that use digital imaging to create printed pieces. Doesn't use film. Think desktop to the digital press. For short -run, fast-



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turnaround jobs. Limitations include color, paper choices, and quality. But not for long -- the technology is exploding!

6. Letterpress the original process founded by Gutenberg in 1440. "Relief" printing like rubber stamps, images on the plate are higher than the surface. Fewer and fewer printers are doing fine letterpress.
7. Screen a.k.a. silk-screening. Ink is forced through a screen following a stencil pattern. Used for ring binders, t-shirts, bumper stickers, billboards.

Typography is the art and techniques of type design, modifying type glyphs, and arranging type. Type glyphs characters are created and modified using a variety of illustration techniques. The arrangement of type is the selection of typefaces, point size, line length, leading line spacing and letter spacing.

Type color is a typographic term referring to the weight or boldness or lack of boldness of a font. It is such called because type color affects the amount of black on the page. "**Black**" fonts are bold and heavy.

Like everything else around us, **typography** is an evolving science based on experiments with few successes and many failures. If you take a look at an old book, of any language or script, published about forty or fifty years ago, you will notice that the size, shape and style of the typefaces used is very different from the ones that are in use today for similar publications. Many major improvements have come about due to technological innovations, competition between publications and other media, as well as changes in reading habits.

Desktop publishing also known as DTP combines a personal computer and page layout software to create publication documents on a computer for either large scale publishing or small scale local economical multifunction peripheral output and distribution. Users create page layouts with text, graphics, photos and other visual elements using software such as QuarkXPress, Adobe InDesign, the free Scribus, Microsoft Publisher, Apple Pages and to some extent any graphics software or word processor that combines editable text with images. For small jobs a few copies of a publication might be printed on a local printer. For larger jobs a computer file can be sent to a vendor for high-volume printing.

The term "desktop publishing" is commonly used to describe page layout skills. However, the skills and software are not limited to paper and books. The same skills and software are often used to create graphics for point of sale displays, promotional items, trade show exhibits, retail package designs, and outdoor signs.



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1.15. QUESTIONS FOR PRACTICE

1. What is typesetting?
2. What is linotype and how it is different from monotype?
3. What is hand composing and who invented it?
4. What is quad?
5. Explain the term pica and point
6. What are the disadvantages of lino type setting?
7. What is the difference between metal type and digital type?
8. Define printing process.
9. What is a four colour offset machine.
10. What is DTP?
11. Write short note on
 - Galleys
 - Proofing methods
 - Planography
 - Sheet fed offset
 - Lower Case
12. Explain the process of hand composition and discuss its advantages.
13. What is digital typesetting?
14. Compare mechanical composing with computer type setting.
15. Why offset printing process has become popular today.
16. What is DTP technology? Discuss its merits.
17. What input and output devices are used for DTP.
18. What is flexography? Compare it with letters presses.
19. What are the new horizons in printing technology?
20. Briefly discuss the principles involved in different printing processes.
21. Discuss computer hardware for DTP.
22. Differentiate between scanner and image setter.
23. Enumerate the principle of colour separation.

1.16. SUGGESTED READING

1. Handbook of Print Media by Helmut Kipphan published by Springer
2. Printing Technology Design Concepts by J. Michael Adams