



# THE ROLE OF PRE-15<sup>TH</sup> CENTURY PRINTING TECHNIQUES, THE RENAISSANCE PERIOD, AND THE INDUSTRIAL REVOLUTION AT THE END OF THE 18<sup>TH</sup> CENTURY

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## ABSTRAK

Tujuan artikel ini adalah untuk memberikan pemahaman kepada masyarakat tentang pentingnya peran teknik percetakan di masa lalu. Metodologi yang digunakan penulis berdasarkan studi literatur, metode Hasil penelitian ini mengungkapkan, buku dan poster merupakan dua media komunikasi sekunder yang merekam teknik percetakan pada masa-masa penting dalam sejarah dunia, yaitu ketika benua Eropa mengalami apa yang disebut dengan kelahiran kembali atau renaissance, dan titik awal lahirnya Revolusi Industri yang masih berlangsung hingga saat ini. Penulis menemukan bahwa selama penggalan ilmu pengetahuan kuno, teknik percetakan turut andil dalam penyebaran berbagai literatur kuno yang didesain ulang dengan susunan teks dan unsur grafis berupa literasi yang dibaca oleh masyarakat, dipelajari, dan pada akhirnya mampu dibangun kembali. kolektif peradaban yang lebih modern dan modern. Bahkan selama Revolusi Industri, teknik pencetakan digunakan pada poster untuk menyebarkan pesan komersial dan informasi. Dengan demikian, penulis menyimpulkan bahwa teknik percetakan penting tidak hanya dalam menyebarkan ilmu pengetahuan dan menciptakan karya seni baik dalam bentuk buku maupun poster, tetapi juga sebagai kajian sejarah yang menarik untuk dipahami masyarakat luas.

## ABSTRACT

*The purpose of this article is to provide the public with an understanding of the important role of printing techniques in the past time. The methodology used by author is based on literature studies, The results of this research reveal, books and posters are two secondary communication media that record printing techniques at important times in history of the world, namely when the European continent experienced what is called a rebirth or renaissance, and the starting point for the birth of the Industrial Revolution which has continued to this day. The author found that during the excavation of ancient knowledge, printing techniques contributed to the dissemination of various ancient literature which was redesigned with text arrangements and graphic elements in the form of literacy which was read by the public, studied, and ultimately was able to rebuild a more modern and modern civilization collective. Even during the Industrial Revolution, printing techniques were used on posters to disseminate commercial and informational messages. Thus, the author concludes that printing techniques are important not only in disseminating knowledge and creating art work as the the books and posters, but also as an interesting historical study for the wider public to understand.*

**Keywords:** *Printing techniques, books and posters, renaissance and industrial revolution*

## 1. INTRODUCTION

Antara's article on May 7th 2023 mentioned the decline of print media in the country. The increasing number of users who consuming online information is said the cause of the decline in demand for print media. Based on this article, the author feels it is important to examine the role of printing techniques in order to foster public interest in printing techniques and their production, especially the books and posters mentioned in this article. These two media may be forgotten by the current generation, where their lifestyle is oriented towards online media in searching for information. Whereas, previously books and posters were two effective mass communication media that not only disseminated knowledge and information, but also had an artistic side from the graphic design and printing techniques used. The purpose of this writing is so that the current generation understands the role of printing techniques, how the process works, its relationship to graphic design elements, and how it produces printed products, so that they want to explore producing various printed works of art. For academics and graphic designers, it is hoped that this article can add insight into exploring the various printing techniques that have existed, provide a comparison between the work patterns of graphic designers today and the past, so that they can inspire and revive designs that have developed into various forms popular products.

## 2. METHOD

### Research Design

This research design was carried out through a literature review with the collection method through literature studies originating from journals, internet sites and YouTube videos. The data was then analyzed (literature review), this option was chosen because the author compared the selected topics with data sources obtained from journals, websites and YouTube videos that had been collected, then rewritten based on the structure that had been determined.

### State of Art

State of art refers to two research journals. The first is Abdul Malik's research in 2013, his entitled writing "The Gutenberg Revolution (The Meaning of the Invention of the Printing Machine for the Progress of Human Civilization: From Oral Tradition to Written)". He stated that the presence of Guttenberg hand made printing had changed oral tradition into written tradition in European society through publishing books, manuscripts, and newspapers en masse, and gave rise to the literacy movement at that time. The second research from Heri Iswandi in 2016 with the title is "Aesthetic Analysis of Sitompul's Graphic Works Entitled "Want Because You Can" and "Tolerance"", he mentioned various printing techniques in graphic arts, including high print, deep print, screen print, and print flat used in creating various graphic arts. Thus the author concludes that printing techniques have had a major influence on the socio-cultural life of people in Europe in the past, there are several techniques that are we known today, including the high print, deep print and flat print techniques used in producing various graphic visualizations in certain media, including books and posters.

## 3. RESULTS AND DISCUSSION

### Results

This article is divided into three discussions, including the pre-15th century phase which began with the discovery of paper and ancient wood block printing. The second is 15th to 18th century phase, at which time people knew the name Johannes Guttenberg for his metal printing technique, as well as the Intaglio or deep printing technique which also occurred in the same period. The final phase was at the end of the 18th century, which was marked by the start of the industrial revolution and the

development of wood type posters. These three phases are special, because they have different techniques and materials for printing each sheet of paper.

### Pre-15th Century: Wooden Board, a Prelude to Conventional Printing Techniques

China has known printing technology for at least four centuries ago after Ts'ai Lun (or Cai Lun) discovered paper. In the 6th century AD, the printing tool used was a wooden block with a certain relief. This relief could be an image or writing that was inked, then applied to a sheet of paper.



**Figure 1.** Example wood block and its application on a sheet of paper, [www.news.cn](http://www.news.cn)

It is estimated that the wood block printing technique began during the Tang Dynasty in 618-907 AD (Pietzcker, 2024). In summary, the practical use is as follows:

1. The design is made on thin paper that has been treated with adhesive and paste, then carefully stuck to the wooden surface.
2. The paper is separated from the wood, the paste that has stuck is used as a model for carving the wood with a special knife called *quan dao*.
3. The board is given ink made from vegetable material with a dilution adjusted to the water content, using a brush made from palm leaf fibers.
4. After sticking the paper to the board, let it air until the ink dries.

We know this technique as a high printing technique which is now often found to make stamps, pure graphic artwork as a fine art, and printed batik. However, based on the relics found, this technique was previously used to print the contents of Buddhist and Taoist teachings which were usually applied to paper scrolls, the five element Wu Xing books about medicine, literary works and heroic epics. In practice, this technique is not only applied to paper, but also to silk cloth, banknotes and playing cards.

### 15th Century: The Rise of High Printing on Metal and Deep Printing in the Renaissance Period

#### Gutenberg and the High Printing on Metal

Via the silk road, this printing technique on wood blocks spread to Europe. In 1450, a German metal craftsman named Johannes Gutenberg succeeded in modernizing the printing technique by using

metal. He created a series of embossed alphabet letters whose letter composition could be changed (moveable type) according to the text of the word or sentence needed.



**Figure 2.** Embossed alphabet letters from Gutenberg and composing stick, [www.worldhistory.org](http://www.worldhistory.org)

From the YouTube channel Cambridge University Library Special Collections and the britannica.com site, a summary of how Gutenberg printing works is as follows sentences:

1. The embossed alphabet is arranged on a composing stick (a place to place the alphabet composition based on the manuscript being read)
2. The composing stick is moved to the galley tray, which is a container that functions as a place to store text that has been arranged in several composing sticks.
3. The galey tray is moved to the printing machine, the printing operator affixes each composing stick with a pad that has been inked, by lightly pressing on the embossed alphabet.
4. The embossed alphabet is pressed onto the paper surface.
5. In the remaining empty space, manual illustrations are usually added in the form of initials, a characteristic at that time as a form of glorification of the beauty of the art of typesetting which we know as typography.
6. Apart from initials, decorative shapes and illustrations are also created manually. Sometimes wooden prints are used again to print illustrations in large quantities.
7. Text with different colors may be done manually with colored ink, or using separate printing ink



**Figure 3.** Foreword initials, decorative-floral motifs, and black and red text on Gutenberg prints, <https://specialcollections-bloq.lib.cam.ac.uk/>

One of Gutenberg's masterpieces is a Bible print made in Mainz, Germany. In it there is a two-column layout, header, initials, sentence markers (highlights) of course it made by hand and different ink colors. Guttenberg's art work at that time became the basic concept in creating the modern layout structure in print media that we know today.



**Figure 4.** Gutenberg bible in Mainz, German, [www.worldhistory.org](http://www.worldhistory.org)

Gutenberg's discovery was the beginning of a renewal in print literacy. It replaces the role of handwritten manuscript books. Previously, manuscript books were quite expensive and took quite a long time to produce, giving a certain prestige to the person who owned them. At the end of the 15th century, Europe experienced what was called a "rebirth" (renaissance), a movement that was oriented towards the mind, and rediscovered the centers of knowledge from the glory of ancient times, such as the Hellenistic cultures of Greece and Rome. This provided a great opportunity for Gutenberg's printing system to spread knowledge based on the spirit of the Renaissance on the European Continent.

Based on the explanation above, it can be concluded that between the ancient printing techniques in China and Germany, both were oriented towards high printing techniques which utilized higher surfaces in producing text and images. The differences between the two can be seen in the following table:

**Table 1.** The difference between Gutenberg embossed letters and wood block printing

| Gutenberg embossed letters  | Wood block China   | Subject           |
|---|--|-------------------|
| German (+/- 15AD)   | China (+/- 6AD)  | Country of origin |
| Metal material, more durable and not easily damaged   | Wood material, more easily damaged   | Material          |
| Metal is formed into an alphabet (moveable type), requiring special skills related to metal crafts. | Wooden molds are made by carving or carving them onto a board                    | Initial process   |
| More sharper and more precision   | The results are less sharp and less precision                                    | Print results     |
| Efficient and fast mass molding   | It takes more longer time, because of wooden planks have to be carved one by one | Processing time   |

For text only, illustrations are still made by manually or again using wooden prints

Overcoming illustration problems, because it uses woodcuts

Illustration

### Deep Printing Technique or Intaglio

The spirit of the Renaissance is not always about the revival of logical science, but also art. There was Albrecht Durer, a German artist who "fell in love" with the beauty of the Italian art style which is famous for its understanding of anatomy, detail and perspective techniques. In Italy, Durer studied the Intaglio technique and helped spread it to Europe as an iconic product of the Renaissance era. Intaglio is a printing technique that utilizes a deeper surface than the surface of a copper plate. This technique is able to capture detailed and complex images. However, apart from using copper, Durer is also still known as a print artist who experimented with wood.



**Figure 5.** Melencolia I, intaglio printing, artwork from Albrecht Durer <https://mymodernmet.com/>

From the Drypoint YouTube channel: Step by Step Intaglio Printmaking for Beginners, the method used to intaglio printing technique is as follows on sentences below:

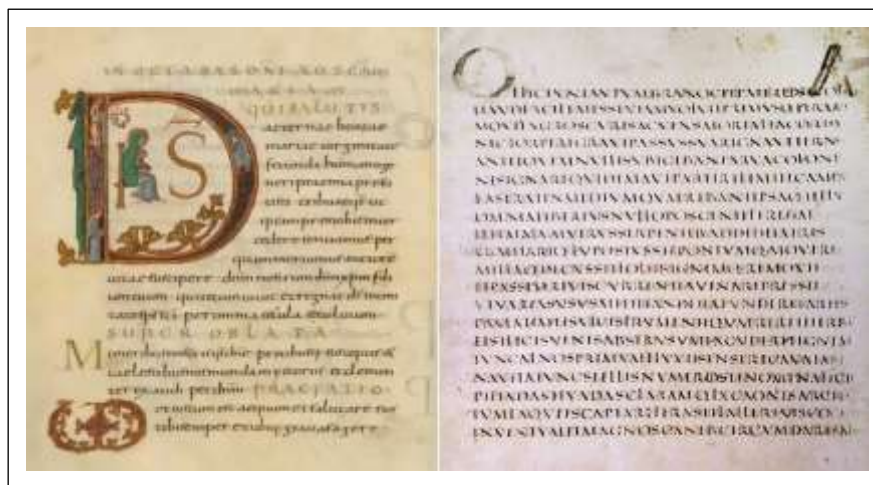
1. Make a sketch first on a piece of paper.
2. Prepare a flat metal plate which made from copper, then carving the copper flat with a small chisel called an *etching needle*, following the sketch you have made. On the surface of a copper plate that has been filed will appear *burrs*, namely the remains of the copper streaks after being filed by the etching needle.
3. The copper plate is then given thick oil-based ink (mixed with magnesium to maintain viscosity), brushed evenly with plastic scrap, then wiped with a soft pad called terleton, until the plate leaves residual ink on the low surface, according to the image in the sketch .
4. The plate is taken to the etching press, coated with several additional materials, then pressed onto the paper surface.



**Figure 6.** Intaglio technique, Drypoint: Step by Step Intaglio Printmaking for Beginners

### Typeface Characters in the Renaissance Period

The appearance of letters or typefaces that developed during the Renaissance period was inspired by letters found in ancient Roman inscriptions and the glory of France during the Carolingian Dynasty (we know him as Charlemagne, a great king from France who controlled Western Europe) (Nikolic, 2023). In the picture below we are shown the Carolingian typeface structure which has strong character, especially in writing lower case letters, and the classical Roman period (which actually has its roots in ancient Greece) which has strong character for writing capital letters.



**Figure 7.** Left: manuscript from Carolingian period in France [www.thecollector.com](http://www.thecollector.com), right: manuscript from Classical period of Roman Empire [www.historyofinformation.com](http://www.historyofinformation.com)

These two cultures still feel their influence until this day. We know the uncial typeface which was inspired by the Carolingian style and Trajan which was influenced by Classical Roman Empire. Both are often used for various purposes in the arts and culture industry, such as film posters or classic European-themed ambience. This cannot be separated from the role of the printing industry which has guarded the spirit of renaissance in the 15th century.



**Figure 8.** Top: Uncial typeface and the application in cover book [fontspring.com](https://fontspring.com)  
 Bottom: Trajan typeface and the application in the film's title [fontsgreek.com](https://fontsgreek.com), pinterest

Talking about printing during the Renaissance period cannot be separated from the existence of Aldine Press, a printing business founded in 1495 by the Italian humanist, Aldus Pius Manutius (in Italian called Aldo Pio Manuzio). As a humanist, Aldus produced classical Greek and Latin works which were sold at low prices (Smith, 2020). The book was made pocket-sized, approximately 12 x 18 cm with a thickness of only 100 to 200 pages, this number was relatively small compared to the literary books that were developing at that time. The key is to use small lower case letters combined with italics and narrowing the space between the letters. The strategy he implemented was able to streamline the amount of paper in order to reduce production costs become cheaper than before.

Apart from the names mentioned above, there are also other figures who have contributed to developing the book printing industry, some of which are as follows:

**Table 2.** There are contributions of several figures in the world of book printing in the post-Gutenberg Renaissance period

| Albrecht Durer  | Aldus Pius Manutius  | Geoffroy Tory   | Nicolas Jenson   | Claude Garamond  |
|---|--|---|--|--|
| Introducing intaglio printing which can be applied as detailed book illustrations, replacing the wood block technique | Using lower case and italics for book efficiency and readability | Introducing Roman-style borders as a part of the elements book design       | Introducing the Roman typeface design which became the standard for writing modern Latin letters | Introducing an elegant typeface style that has high legibility (readability), which became the standard for printed letters in the 16th and 17th centuries. Consisting of capital letters and lower case |
|   | Introducing the economical 12 x 18 cm pocket book size           | Create a Roman style letter structure that is intended for writing initials |  |  |
|   | Established Aldine Press printing as a pioneer of pocket book    | Adding a decorative motif as a background for the initials he made          |  |  |



## Late 18th Century: The Industrial Revolution and Wood Type Posters

The Industrial Revolution began at the end of the 18th century and continues until this day. The industrial revolution that took place simultaneously has changed the human work system, from previously using traditional methods by utilizing natural energy, then changing to manufacturing businesses supported by steam engines, electricity and motor drives. If during the Renaissance, books were the most well-known graphic design products, then during the Industrial Revolution, posters were the most popular, because posters were considered part of an effective campaign strategy to offer commercial products or appeal to the public. Posters are printed in large sizes so they are easy to see and attract the attention of the audience. At that time, we knew that the world had entered the era of capitalism along with the development of the manufacturing industry.

The industrial revolution caused changes in the working system of printing machines with the aim of making it more practical, efficient, cheaper, and reaching a wider audience than before. To print typography on large posters, printing practitioners replaced metal plates which were considered too expensive and inefficient with wooden ones. Darius Wells, he innovated by using a tool called a lateral router. The way this tool works is similar with pantograph, but it is used to make large-sized wooden printed letters called wood type. The styles created are also varied, it seems that Darius and other designers don't want to be confined to the romanticism of the glory of the Renaissance, they innovate in various new typographic styles such as sans serif, slab serif, or decorative design.



**Figure 9.** Left: *Wood type* made by Darius Wells for printing posters ([flickr.com](https://www.flickr.com/photos/dariuswells/)). Right: Poster printed with wood type technique. ([pinterest](https://www.pinterest.com/pin/1000000000000000000/))

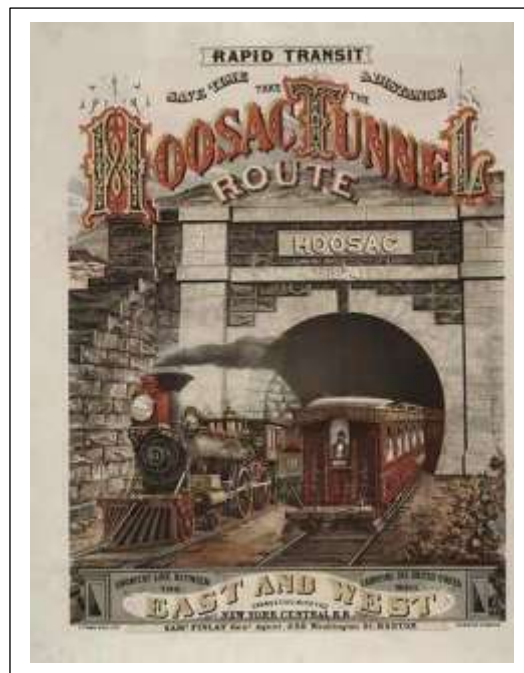


**Figure 10.** Slab Serif (left) is a font that uses hooks (serifs) that are flat and look stiff. Sanserif (middle) is a font created without using serifs. Decorative (right) are fonts made with decorative motifs, italics, or other decorations

## Chromolithography

Chromolithography is a color printing technique using stone media that developed during the transition period of the second industrial revolution. This technique was highly developed in America, and soon gained popularity because it was able to display prints with bright colors. However, it is actually a continuation of previously existing lithographic printing. According to the YouTube channel *Between the lines*, a Japanese language channel that displays several printing techniques, the steps involved in chromolithography printing are as follows:

1. Prepare a square stone that has been flattened with a grinder, then washed with calcium carbonate.
2. Place the image from the pronto plate which has been separated in color on the previously prepared stone, each color will then be moved one by one on the stone surface.
3. Mix the image with resin and talcum, then apply liquid gum Arabic with a brush, then dry with a sponge and wait a few hours so that the image can accept the ink that will be mixed.
4. Prepare ink that has been mixed in color.
5. Place the stone in the correct position on the lithographic press.
6. After the image position is marked, then wash it with turpentine, then apply ink thinly to the image as a base, and clean with water and dry with a sponge.
7. Ink the image using a roll, then position the paper on the stone, and press with a printing press.
8. Repeat stage 7 with the colors that have been separated previously.



**Figure 11.** Poster printed with chromolithography technique, “Rapid Transit, Saves Time and Distance, Take the 1874 Hoosac Tunnel Route”. Features decorative style fonts <https://tfaoi.org/>

In America, Boston became the epicentrum of the spread of chromolithography techniques, Pendleton's Lithograph is the name from the most important studio that trained many chromolithography artists, including John Henry Bufford, he successfully founded the company J.H. Bufford & co. which operates in the printing sector. At that time he received many offers to make posters and illustrations for commercial purposes. Another artist, Benjamin Champney, sold reproductions of his paintings using the chromolithography technique to tourists who could not afford his paintings. Apart from that, he also founded the Boston Art Club. The chromolithography technique is ultimately also used to make molds for product designs made from tin or cans.

If the first industrial revolution was said to be the beginning of the rise of capitalism, then the second industrial revolution, which approximately began in 1870 AD, was an important milestone in the birth of new technology. One of them is the Linotype machine which was patented in the United States in 1884 by Ottmar Mergenthaler, this machine was used to arrange letters to produce magazines, newspapers and printed books in large quantities and efficiently. In subsequent developments, the use of linotype would influence the birth of the art and craft era which prioritized product quality and precision, just as chromolithography also influenced the birth of the art nouveau period which was rich in visual decoration and bright colors.

#### 4. CONCLUSION

Gutenberg and intaglio printing techniques are a harmonious blend of medieval art and printing technology. High Gutenberg prints produce sharp, precise text, while intaglio prints produce detailed, line-rich illustrations. Without forgetting the wood board printing services that had previously been made in China, it became a model for the development of advanced printing techniques in the following period. Meanwhile, in the next few decades, chromolithography printing techniques emerged as a color printing solution that developed during the industrial revolution. This technique was the background for the design movement that followed, in the period of the second industrial revolution. In graphic design, the layout structure that we know today, where there are highlights that mark text, division of the number of columns, use of margins and headers, italic writing, lower case and capitals, is a legacy from the time of Gutenberg, Aldus Manutius, and others. The influence of the glory of the past, Greek Hellenism, the Roman Empire, and the Carolingian Dynasty in France have had a major influence on the creation of the Latin script we know today, and is still preserved in various types of serif fonts such as Trajan, Roman, and others because it was encouraged by the emergence of printing industry. Printing techniques, graphic design and past styles have become one unit in the production of printed books and posters, which are currently experiencing a decline due to the development of digital technology. Technology cannot be avoided, but past glories can be presented as part of popular culture.

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