A BRIEF HISTORY OF PRINTING. FROM THE 15TH CENTURY TO TODAY

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Far fewer people would be able to read, many would still speak Latin, news of historic events would never have reached us, and the greatest scientific discoveries would have arrived centuries late. If printing hadn’t been invented, that is.

Our blog has a section called “World of Printing” which is packed full of fascinating facts for ink and paper enthusiasts. One glaring omission, however, was an article covering the **history of printing**. But that’s now fixed: in this post we travel through time and, stage by stage, we look at the most important technological breakthroughs in printing. It’s an absorbing story spanning fifteen centuries, so we’ll have to content ourselves with an overview of the most important events.

**First stage: woodblock printing**

**We’re in 6th-century China during the Tang dynasty.**One of many inventions to emerge from this great empire was a system of printing using wooden matrices that were engraved, inked and pressed onto a sheet of paper. The scope of this invention was such that, in modern Chinese historiography, printing is considered one of the four great inventions of Ancient China.

One of the first books printed with woodblocks was a copy of the Diamond Sutra (868 AD), a six-sheet scroll over five metres long. Recently, a Korean pagoda was discovered with an even older text dating to 750-751 AD.

**Second stage: movable-type printing**

We’ve arrived at one of the most important stages in the history of printing: the advent of movable type. And once again, this invention came from China. **In 1041, the printer Bi Sheng invented movable clay type**. However, it had the drawback of breaking easily. In 1298, the inventor Wang Zhen began using much stronger wooden type and invented a complex system of revolving tables that improved the quality of printing.

**Now fast forward to the 15th century and the introduction of movable type in Europe by Johannes Gutenberg.**The centrepiece of his technique was the punch, a steel parallelepiped whose head was engraved in relief, and back to front, with a character: a number, letter or punctuation mark. The punch created the matrix in which type was cast, then placed on a tray, inked and pressed onto paper.

**So, what were Gutenberg’s three major innovations?**

* He was the first to use oil-based inks, which lasted longer than the water-based inks used previously.
* His type was more robust because it was made from an alloy of lead, tin and antimony.
* And he invented the first printing press, which was inspired by the grape press.

On 23 February 1455, after about a year’s experimentation, **the first Gutenberg Bible was published with a print run of 180 copies.**

**Third stage: the rotary press**

Let’s jump forward again, to the year 1843.**We’re in the United States and Richard March Hoe has just invented the first rotary press**, perfected in 1846 and patented in 1847. Initially, this system was hand-fed with single sheets until, **in 1863, William Bullock introduced a press that was fed by a paper roll**: the images to be printed were curved around rotating cylinders. There was no longer a flat surface that exerted pressure to print: instead, the paper passed through a cylinder which exerted a far greater force. Thanks to the mechanisation of the process and the introduction of continuous paper rolls, rotary printing presses could print up to 8,000 sheets an hour. **Which makes it the first press suitable for large print runs.**

In 1846, the rotary press started being used to print the Philadelphia Public Ledger.

**Fourth stage: offset printing**

**In 1875, Robert Barclay invented the offset press for printing on metal.**Then, in 1904, Ira Washington Rubel adapted the technology for paper. This indirect method of printing is based on a very simple chemical phenomenon: the repulsion between oil and water.

The printing process is anything but simple though. An offset plate is divided into two areas: the image area, which is lipophilic and therefore attracts the ink; and the non-image area, which is hydrophilic, and repels the ink. The plate is dipped in a solution that binds to the non-image area, and then inked. In this way, the ink only adheres to the image, which is then transferred first to a rubber cylinder and then printed onto the paper.

**What are the advantages of offset printing?**

* It generates very sharp, clean images.
* High-quality printing on any type of paper, even if it has a surface that isn’t perfectly smooth.

**The disadvantages?** Offset presses are bulky and require lots of maintenance. Which is why this printing system is only cost-effective for large print runs.

**Fifth stage: the linotype machine**

**In 1885, German inventor Ottmar Mergenthaler developed the linotype,** a typesetting machine. The advantage of this system was that it automatically composed lines of type. It worked in much the same way as a typewriter: the operator composed lines of text by pressing keys on a keyboard. Each key would release a matrix for the corresponding character and this matrix would align with the others. The line of matrices was then filled with molten lead, cast, inked and used to press the characters onto sheets of paper.

Although it is a seemingly elaborate process, linotype significantly sped up printing. It meant that typesetters no longer had to compose lines of print by hand, one character at a time: everything was mechanised.

**In 1886, the linotype machine was used for the first time to print the “New York Tribune”,** a daily newspaper founded in 1841 in New York. In Italy, it was first used in 1897 to print the “Tribuna”, one of Rome’s leading dailies.

Thomas Edison called the linotype machine “the eighth wonder of the world”, which underlines the importance of this machine in the history of printing.

**Sixth stage: the laser printer**

**In 1971, the Xerox Corporation developed laser technology.** In a laser printer, the content to be printed is generated by electronic processes and printed directly onto the sheet of paper. To be more precise, the laser transfers the image to a photosensitive selenium cylinder (called a “drum”) and from there, using toner, it’s directly applied to the paper. With this system, it’s possible to print around 20,000 lines a minute. Record breaking. But more importantly, from this point on, **anyone could print whatever they wanted, whenever they wanted, in their office or home.**

Bulky, complicated and very expensive, the first laser printers were quite different from those we’re used to today. And we had to wait until 1982 for the first desktop laser printer to be released by Canon. However, its high cost meant few could afford one. It wasn’t until the beginning of the 1990s that laser printers became widely accessible to the public, along with inkjet, dot matrix and dye-sublimation printers. Ever since, printers have become ever cheaper, more compact and efficient.

**The last stage: 3D printing**

We’ve reached the present day. We end our journey through time in the era of the 3D printer. This printing technology was actually developed some years ago, **in 1983 to be exact, when Chuck Hull used UV rays to harden varnishes.** The engineer baptised his invention “stereolithography”: a method that allows solid objects to be created by adding overlapping layers of a photosensitive liquid polymer which has been struck by UV light. But where does it start from? From a 3D model produced by modelling software, like Blender, AutoCAD or OpenSCAD.

Today, there are various technologies for 3D printing. They mainly differ in the way that they assemble different layers: they can use materials that are melted by heat, liquid materials that are hardened or materials that are laminated and bound together.

It has taken years for 3D printing to become widely used. Why? Because the cost of this technology was initially extremely high. But now 3D printing is used in many fields – from architecture to archaeology, from art to healthcare – with more being added all the time.