

HISTORY OF PAPER

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The dictionary definition of paper is a substance made from cellulose fibres derived from rags, wood or straw often with other additives, and formed into thin, flat sheets. The word is derived from the Latin word papyrus, meaning a reed.

More than 5,000 years ago the Egyptians used these reeds, cross-woven into a mat and pounded into thin, hard sheets. However, it was a Chinese man named Ts'ai Lun, who, in AD 105, invented paper as we know it today.

There is evidence of papermaking in Japan around AD 610. The Japanese used mulberry bark and developed cottage industries in papermaking which continue to this day.

In AD 751 the Arabs captured some Chinese prisoners at Samarkand and forced them to teach them the papermaking process. The paper the Arabs produced consequently was made with linen rags. It is known that there was a papermaking factory in Baghdad in AD 793 with Chinese workmen. From this time onwards the craft spread westwards, and when the Moors invaded Spain they introduced papermaking on a larger scale.

The earliest reference to an English paper mill is in a book printed by Caxton in about 1490. The mill belonged to John Tate of Hertfordshire and the paper was used for an edition of Chaucer's *Canterbury Tales*. Several more mills were recorded over the next 100 years but were not very successful; one reason that has been suggested is that papermakers were thought to help spread the plague by using discarded rags infected with disease.

The first known American paper mill was established at Germantown, Pennsylvania, in 1690. It used the European rag method. However, rags were becoming increasingly scarce and with the Industrial Revolution this problem became worse. As paper was still hand-made, output was low, but there was an increasing demand for paper – books for the educated classes and for the poorer classes, who were beginning to be educated by charitable bodies and the Church; account books for the growing export trade; and daily newspapers were introduced at the beginning of the 18th century.

Seeing a need for machinery, Louis Robert, a clerk in a French mill, invented a crude papermaking machine in 1799. A model of this can be seen in the Science Museum in London. This particular machine was not very successful, but was used as the basis for an improved machine. This venture was funded by brothers Henry and Sealy Fourdrinier and developed by an engineer, Bryan Donkin. After many trials and much expense the machine was finished in 1803 and erected at Frogmore in Hertfordshire. Due to the great cost involved in developing this machine, the brothers lost a fortune, but the name of Fourdrinier lives on in the basic principles still in use today.

Paper mills today use wood pulp or recycled paper. In the United Kingdom approximately 50 per cent of the paper produced is made from recycled paper because it has no major forest resources as there are in the United States and Scandinavia. Wood pulp comes from lumber waste and from trees, which are being constantly replaced, often by fast-growing conifers. One averaged-sized tree is needed to make sufficient paper for 400 copies of a 40-page tabloid newspaper. There are three methods of extracting wood pulp: chemical, mechanical and semi-chemical. Combinations of these pulps are sometimes used, depending on the use of the finished product.

Paper mills are extremely efficient users of energy. They produce electricity, and in the United Kingdom are the second largest private generator – steam drying of the moist paper is one way in which electricity is generated. Water is also recycled during the papermaking process. One million cubic metres (metric tonnes) of water are used daily in paper manufacture – 34 per cent for processing and 66 per cent for cooling. All the cooling water is returned to source and the process water is treated and either discharged or re-used.

Some papers are still made by hand today, but the craft is not widely practised; the papers that are produced are specialist papers and costly. The mechanical papermaking industry continues worldwide and is constantly improving its techniques.