# Paperboard

## Since When has Paper Been Known?

The invention of paper is attributed to a Chinese poet around 105 A.D. Paper was brought to Europe by the Arabs in the 8th century. But we had to wait until 1799 for Frenchman Louis-Nicolas Robert to invent the first machine that allowed for the continuous production of paper to replace the sheet-by-sheet method used so far. Mass production of paper started in Europe and in the United-States around 1825. And we had to wait until 1850 to see the creation of the first multi-layer cardboard.

Today fourdrinier table machines have been fitted with many technological innovations and can be up to 120m long. There are also round paper machines mainly used to produce luxury paper.

## How is Paper Pulp Produced?

Nowadays, paper is made of timber whose cellulose fibres are isolated through a slushing process. The timber mainly comes from offcut wood – wood chippings, etc. – or from tree pruning. Cellulose from soft-wood trees has long fibres that make paper highly resistant, which is essential in the case of newsprint, as it must run through rotary printing presses. On the other hand, the cellulose from hardwood trees has shorter fibres that can be used in less mechanically strenuous applications. Cellulose can also come from other plants like straw, linen or hemp.

The pulp is then refined in order to hydrate the fibres and make them swell and intertwine.

Additives are then added to the cellulose fibres in order to improve the properties of the paper. They are either added directly to the pulp or added later on as coatings on the sheets of paper.

There are two types of additives:
- **Mineral coatings** – calcium carbonate, China clay, talcum, etc. – make sheet paper white and opaque and provide for the paper's stability and printability;
- **Additives** – glues, pigments – avoid e.g. for the inks to diffuse too much in paper.

## There are two processes to extract cellulose fibres and two types of pulp:

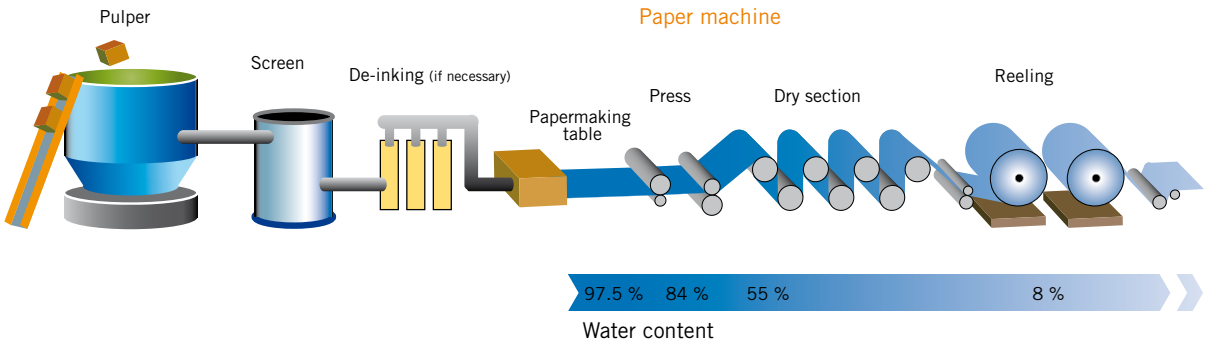
- **A mechanical process**: using rasps and pulpstones called stone grinders, it is possible to get so-called "mechanical" pulp;
- **A chemical process**: using chemicals like bisulphite or sulphate, it is possible to get so-called "chemical" pulp.

There is also a semi-chemical process, which is a combination of both aforementioned processes.

There are therefore two types of new or virgin pulps whose features are different:
- **The mechanical pulps**, which will be used to produce newsprint or glossy magazine paper; and
- **The chemical pulps**, which will be used to produce printing and writing paper, as well as wrapping paper.

In its natural state, the new pulp is ecru. To get white paper, it has to be bleached, which is often made using oxygen peroxide for mechanical pulps and chlorine-based products for chemical pulps.

## How is Paper Manufactured?




The washed, diluted and deaerated pulp is spray-washed on the whole width of a linen conveyer belt called the paper-making table, which is moving sideways to and back. This jerky movement favours the homogeneousness of the paper sheet and its partial drying. This first phase is called the wet phase. The paper sheet is then carried through presses made of two cylinders covered with absorbent felt. The sheet then goes through the dry part or dryer section made of cast-iron drums heated from the inside.

The final process is spread coating or coating of the paper sheet in order to improve its features. The mix used to this end is starch – or other materials – based and spread over the surface with glue-spreading machine.

The paper sheet may still be treated further; it can go through a machine stack made of polished steel rolls to be processed or given a silk finish. It can also go through a calender or supercalender to be given a glossy finish. The paper sheet is then coiled and cut in reams of 500 sheets or cut again into smaller reels.

## Are There Different Kinds of Paper?

There is a great variety of papers: from newsprint to silky paper through toilet paper, cigarette paper, paper money or sheet carton, etc.

## What is the Difference Between Paper and Cardboard?

Paper and cardboard are made using the same process. The only difference is in the base weight per $m^2$: paper has base weights in a bracket between 40gr/$m^2$ (newsprint) and 120gr/$m^2$ whilst cardboard is much heavier.

## What are the Standard Sizes of Sheet Paper?

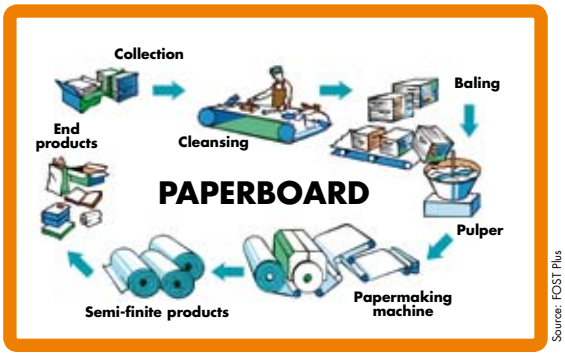
According to international standards, the basic size is and remains the square meter. If the square meter sheet is split up in half, in four, in eight, etc. the following sizes can be obtained:
A0 840 x 1,188 mm (= 1 $m^2$)
A1 594 x 840 mm
A2 420 x 594 mm
A3 297 x 420 mm
A4 210 x 297 mm = the classical size of a sheet of paper
A5 148 x 210 mm

## Why is Paperboard Recycled?

Newspapers, packaging, industrial and household papers, as well as production trimmings can be easily recycled. Hence, half of the fibres used by the French papermaking industry come from recovered paper and cardboard. In Luxembourg in 2006, 89.44% of the 15,385 tons of paperboard put on the market for packaging purposes are recycled products.

## How is Paperboard Recycled?

The paper recovered is mixed with water, chemicals and soap in the pulper. This brings the fibres into suspension, leads the fibres to separate from the ink and bleaches the pulp. A screen allows removing all undesired products such as staples e.g. in liquid flotation units, fine air bubbles are injected into the pulp. Using a physical and chemical process, the ink mixed with soap is carried up to the surface thanks to the soap hooking on to the air bubbles. The same process is repeated in several successive units. The performance of the deinking line and the use of hydrogen peroxide allow getting a pulp as white as desired. The recycled pulp then goes back into the traditional papermaking workflow. It can be used alone or combined with virgin paper pulp.



Source: FOST Plus

## What Can be Made with Recycled Paper?

All Luxembourg dailies - Wort, Tageblatt... – are fully or partly printed on recycled paper.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