

Papermaking by hand at Hayle Mill, England in 1976  
<https://www.youtube.com/watch?v=Xs3PfwOIto>

[tinny music of the early 20th century]

Title: Bygones Part Two

Audio – “Bygones” television series presenter, Dick Joice:  
Welcome back to part 2 of “Bygones.”

It’s almost exactly 500 years ago since William Caxton first started printing books on his printing press. He was, of course, the first in England. But up to that time, all books had been written by hand, which was a tedious and time-consuming process.

On the other hand, the papers on which the books were printed continued to be made by hand right up to the 19th century. Today we believe that there is just one firm left in England who still makes paper in the old-fashioned, traditional way. This paper is used chiefly for artwork and repairing old books and manuscripts. This is a sample of it, and lovely paper it is, too, and it’s obviously very costly because every sheet is made individually. But we went down to the works in Kent recently to see this fascinating process being carried on.

[Sound of birds chirping and water running.]

[Narrator]

Nestling in this attractive little valley outside Maidstone is the Barcham Green paper mill, and it is here that Simon Green runs a family business unique in this country.

[Simon Green]

Maidstone has been the center of papermaking for many hundreds of years, and indeed it is the main center in this country and one of the main centers in Europe. So, there was a local tradition, and the craftsmen were available, and papermaking craftsmen were in a guild and there were all sorts of restrictions, and so you had to start in an area with a tradition. This little valley has a very consistent stream, water all the year and a lot of water power, which was essential because there was no electricity in it and not even steam engines when the mill was built. And finally, we have very good water in this area, the whole of the Maidstone area is alive with streams, springs with very hard water, and we’ve got two springs on our premises which we use and, other mills in the area had the same sources, so those are the three main things really.

Initially, we start with the beater, which is a large oval tub with a heavy roll rotating in it. And we start with the roll turning and with water in the beater, and then we gradually add in the cotton linters, which comes to us from a specialist pulp mill in bales. The cotton is put into the beater, and it takes about 15 to 30 minutes to disperse it and make it into a slurry, which we call a “half-stock.” After this is done, we can actually lower the roll of the beater down onto the supporting “bed plate” as we call it, and this crushes the little cotton fibers – of which there are hundreds of millions in the beater: splits them, bruises them, and this has a tremendous effect on the way the paper will finally be. It’s the most important part of the process. And then, after a period of time, between 2 and 8 hours depending on the paper, we can let the pulp run down to the next stage in the process.

The pulp has come down the pipes into a storage chest or tank where it is suspended by an agitator. And then it’s pumped by a series of chutes into what is called the “vat.” The vat is really just a rectangular tank with a stirrer in it, called a “hog,” and it can also be heated to help the fibers drain and make it more pleasant for the crew to work. The key craftsman is called a “vatman,” and he stands at the vat and drains away the fibers by dipping into the pulp what’s called a “mould.” Now this is a very special piece of equipment, which we have made here at Hayle Mill, and it is essentially a wooden frame with a removable edge called a “deckle,” which holds the pulp in, covered by a special kind of phosphor-bronze gauze cloth. And, essentially, all that happens in the process is that the water is drained away from

the fibers, leaving a sheet of paper behind. Now, you can appreciate that this is easily said and difficult to do. The paper has to a consistent weight both from sheet to sheet and from end to end, it mustn't be cloudy, and it must be right in every way. So, the vatman spends many years learning his craft.

Whilst looking at the mould, one can refer to the watermarks, which on this mould are along the bottom edge. These are made from pieces of bent wire, which are hand-formed and sewn onto the surface of the mould. Our moulds always include our own symbol and the year of manufacture, the fact that they're handmade (incidentally, the watermarks are reversed on the mould), the name of the paper, in this case Crisbrooke, and sometimes we put in an additional watermark. John Branston is an etcher whom we've dealt with for many years, and he has paper specially made with his own signature as part of the watermark. The moulds are therefore a strainer, and they're used to produce the first sheet of paper.

The coucher's job is also a difficult one, because he can very easily ruin the paper by pressing unevenly or allowing the mould to slip on the special types of felts which we use. And, so he has to spend some years learning his trade as well, and generally, the young people who come into the mill learn first one task, and then they later move on to couching, and finally to vatting. We use water which we have on the site, which is partly used simply to transport the pulp around the place and to help in its processing, but it also has a natural chemical relationship with the cotton, and this chemical bonding is what holds the paper together. There's no gums or glues to hold it together, it's a purely natural bond.

Watermarks are essentially thin areas in the sheet which are more transparent, and these are arrived at by sewing fine wires onto the surface of the mould, so there's less fiber where the wire is and it's thinner and more transparent. Watermarks serve a variety of functions: they may be fairly mundane just to say that the paper's handmade or to identify that it's made at this mill by our symbol, or we can do very special watermarks, for example, at the moment we're making some special note paper for a company up north with a Phoenix watermark, which is quite complicated and which has been specially designed by Elizabeth Drink, who's a very well-known artist. This is an exceptionally complicated one, but we can do quite simple ones as well.

The coucher builds up a post, that's interleaved felt and paper of approximately 100 sheets all together, and when this post is complete, it's taken to the press which is hydraulically operated and its function is to remove the water from the paper. The total loading on the press is about 200 tons and this reduces the water content to about 50%. It was 99% in the vat, so already part of the drying has been done just by pressing. The pressing takes about 5 or 10 minutes, and then the post is removed again from the press by the third member of the crew, the layer, and he's usually a person who's only started training recently, and the first thing he's learnt to do is to handle paper when it's dry and later when it's wet. And his particular job here is firstly to supervise the pressing, and then to separate the sheets of paper from the felts. The felts are then reused. Obviously, the paper is still very wet and it's very easy to damage it – to tear off the corners or to make thumbprints and so on, and he also has to lay the paper exactly in a perfect stack.

The paper can be dried by various processes, but most commonly it's dried on what we call a "cylinder dryer." This consists of a large steam-heated cylinder whose temperature is such that it drives the water off the paper, and the paper passes round the cylinder held on by felts, which are tightly pressed against the cylinder; and this gives it a fairly smooth surface, which in our obscure jargon we call a "knot surface." There are three surfaces, in fact, that the "rough surface" is really quite rough, and this is dried in another way without any restrictions on it, so it's dried with hot air. The third surface we have is called "HP," which means "hot press" – actually, an obsolete process. Nowadays, the knot surface paper, the medium purpose, is interleaved with zinc plates and then it's put through these very heavy rolls which have very high pressure and a certain amount of slippage. And this polishes the surface to give a very smooth, shiny surface suitable for certain types of printing and fine drawing and calligraphy, etcetera.

Hayle Mill is unusual in quite a lot of respects and probably unique in the world in employing an artistic director. Graham Clarke is a full-time professional watercolorist and printmaker, but he's also active in the mill in giving us advice on the use of papers and particularly giving us an entirely different point of view on paper from what we have as papermakers.

[Graham Clarke]

It's very difficult to express why one likes handmade paper, but it's something, uhm, a similar feeling about why one prefers homemade bread or homemade anything else. It has a certain quality which can't be got in any other way. Certainly machines can't do it. There is the advantage also that it's possible to have one's own watermark in handmade paper because the runs are relatively short. A machine would be very costly to put one's own watermark in it, but here, at this mill, we can put a watermark in a relatively short run of paper. The particular paper I'm using at the moment is for printing etchings on. I like to damp the paper before I print it, and it's better to have a paper that hasn't got to soak for a long time, so I use what's called a "waterleaf paper," uhm, rather like a blotting paper, it absorbs water immediately. That saves time. It also has to be relatively soft when it's done so that it would take the impression of the ink in the etching press.

[Simon Green]

History seems to indicate that the firms which survived in the handmade industry were those which were making speciality products, very high class and expensive products. One has to remember that until the invention of the paper machine, even the most mundane papers – wrapping papers, newsprint and the like – were made by hand, and clearly the mechanization made the hand process uneconomic for such papers: the amount of profits seemed to be too low, but we've held on, and of course we're now benefitting from the resurgence of interest in crafts.