

# The Vegetable Parchment Mills (VPM)

Also known as William Joynson's Mill, St. Mary Cray Mill & Delcroix.

## Pre - Vegetable Parchment Production History:

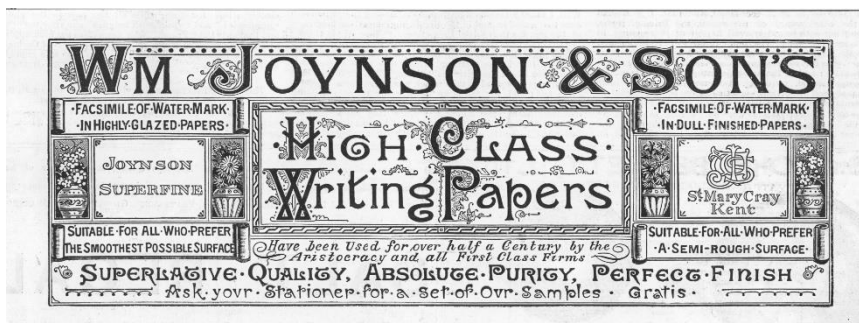
The St. Mary Cray / St Paul's Cray area of North Kent was home to a number of hand made paper mills but, sadly, the records do not always clearly define the precise location nor whether the mills were separate entities or the same mill which was sold from one owner to the next. The St. Mary Cray site was previously the home of one or more hand-made paper mills owned by Nicholas Townsend (1757) and William Sim (1771). In 1786 there is mention of Samuel Lay who also owned a mill in Sittingbourne. In the early 1800's there are two distinct mills operating, one by Martha Lay (excise No. 326) the other by John Hall of Dartford (excise No. 327).

William Joynson leased the mill(s) and surrounding land in 1835 from Joseph Berens. This was renewed several times until Joynson purchased the land in the 1880's. The exact date of the installation of the first Fourdrinier machine is unknown but, as Joynson was awarded a patent for a novel Dandy roll in 1839, it is not unreasonable to assume the machine was installed soon after the initial leasing of the site. John Marshall (London), and subsequently John & Christopher Phipps (Devon), developed the first Chain & Laid Dandy rolls for consolidating the web on a Fourdrinier machine. However, William Joynson was granted a patent (No. 7977) for the design of a roll to consolidate the upper surface of the sheet whilst imparting an imprint of "devices, letters or designs" (a watermark). Joynson is rightly regarded as the originator of watermarked paper produced on a paper machine.



A second Fourdrinier machine was added in circa 1853 together with an expanded rag sorting facility.

In 1860 the London, Chatham & Dover Railway (LC&DR) opened the 22-mile-long "Western Extension" between Strood and Bickley - this included a station at St. Mary Cray. The arrival of the railway considerably assisted in the supply of rags which could now be economically collected and transported from a much larger area.



The rags were delivered by rail to St. Mary Cray station where the bales would be transferred to horse drawn wagons and delivered to the mill (less than half a mile away). During the time that Joynson owned the mill, it was famous for the

quality of both writing and art papers (drawing and water-colour). These papers were still made into the first quarter of the 20<sup>th</sup> century along with security & stamp papers.

The Joynson family sold the mill in 1931 to Wiggins Teape (WT) / Papeteries Delcroix. By 1933 it had been rebuilt and was renamed The Vegetable Parchment Mills. Delcroix had, for some years, produced VP in Belgium at Nivelles Mill. WT purchased Delcroix outright in 1957.

During the 18<sup>th</sup> and early 19<sup>th</sup> century, the mill was operated by waterpower but this was replaced in the 1830's (probably) by steam power. The River Cray operated the waterwheel (thought to be overshot) and the remnants of the iron wheel and housing were still visible in the late 1960's when the mill closed. The River Cray ran along the rear boundary of the mill and the mill effluent was discharged into the river (as was Nash Mill's effluent further down stream) considerably swelling the volume. The river course has now disappeared from the area maps and it is presumably run through a culvert under the recently built B258 – Mill Brook Road.

### **Wiggins Teape - The Vegetable Parchment Mills.**

As the name suggests the main product was Vegetable Parchment which was used for wrapping butter, margarine & lard but the mill also produced industrial grades of laminated "Vulcanised Fibre" (VF). These were used as formers for transformer windings and in the manufacture of Pit Prop Caps. In addition, the mill produced food grade non-stick silicone coated vegetable parchment, marketed under the tradename of Bakewell Parchment. Siliconised paper was also used as the backing / rub-down paper for "Letraset" dry transfer lettering (not often used today!). A limited tonnage of decorative parchments were also manufactured.

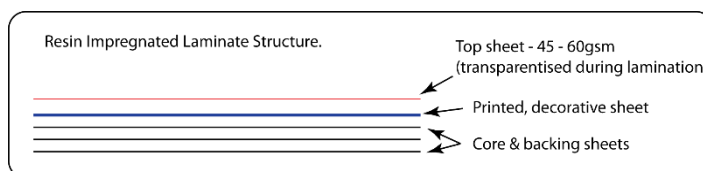
*Vegetable Parchment should not be confused with either Greaseproof paper or Glassine.* These products are made from very well beaten stock and are heavily calendared / super-calendared. Neither grade is parchmentised & they are therefore regarded as grease / oil resistant only.

### **Papermaking:**

Stock prep. consisted of conventional beaters, refiners, cleaners, etc. These fed a Fourdrinier machine (deckle: 2.4m / 96") which, from memory, ran at around 80 - 100 m/min). It produced mainly waterleaf (unsized paper from woodpulp / cotton linters) and genuine rag paper (from 100% cotton rags). Depending on the grade being made, production was in the order of 1 tonne / hour or slightly less for lightweights.

The paper produced at the mill was unsized (internally or surface) and was therefore highly absorbent. This made the web ideal for use in the production of Formica and similar impregnated laminates.

The construct for such laminates consisted a lightweight top paper (45 – 60 gsm) a decorative paper – usually either a solid colour or a wood



grain pattern and several sheets of body paper. Each layer was impregnated with melamine formaldehyde resin by the customer and compressed by use of a heated platten to form the well know laminate used widely for kitchen worktops and decorative wall panels in the 1960's / 70's.

### **Parchmentising:**

Parchment was produced by passing an unsized web of paper (waterleaf) through a bath of sulphuric acid (circa 85% concentration). Acid concentration was measured by hygrometer in degrees Baumé. The sulphuric acid dissolved the surface on either side of the web which was

then re-solidified by passing it through a weak acid bath and then washed in a series of water baths. The resultant sheet's structure was a dense impervious surface on either side with a thin core consisting of very few fibres that maintained the integrity of the sheet during the parchmentisation process.

Parchmentising was accomplished by use of two identical machines at VPM (See appendix 1).

If the sheet dwelt in the strong acid bath for too long it would be totally dissolved (i.e. no fibre core) but, if the time was too short it would be permeable to oils and fats - no good for wrapping butter, margarine, etc.! Alternative chemical compounds could be used to parchmentise paper (e.g. zinc chloride) but these were not approved for wrapping foodstuffs.

Webbing up the parchmentiser consisted of feeding the sheet into the sulphuric acid bath under a minimum of 4 rollers and then into the weak acid bath and subsequent water wash baths. Remembering this was in the 1960's, the crew literally rolled their sleeves up and fed the paper under the rollers with their hands / arms immersed in concentrated sulphuric acid. Although protective aprons and long gloves were available, I do not remember them being routinely used . . . not sure that would be allowed under current Health & Safety legislation ! Initial webbing up of the parchmentiser had to be rapid in order to avoid the web dissolving totally.

The final structure of the sheet was virtually 100% cellulose with almost zero air content as there was little fibre to trap the air. This resulted in a density of around 1.3 g / cc, compared with bond and offset papers with a typical density of 0.75 - 0.85 g/cc. Shrinkage was considerable during production - approximately 25 – 35% of the deckle was lost during parchmentising and drying.

The Mill also produced Vulcanised Fibre (VF). This is similar to vegetable parchment production (i.e. passed through concentrated sulphuric acid) but, in this case, the webs were produced from recycled rags. The mill purchased unbleached, rag pulp from Asia (principally India). Other grades of paper, used in road construction, were produced from kraft pulp.

Although the basic process is similar, VF is produced by parchmentising a number of webs at the same time and bringing these webs together whilst still in the acid bath. This action fuses the sheets together during the weak acid / water washing process. The resultant sheet would be circa 800 – 1500 micron thick. See appendix 1 for schematic.

#### **Electrical uses:**

VF had many uses mainly due to its superb electrical insulation properties – a piece 1.2mm thick could withstand 40,000 volts with ease. It was also impervious to oil & water.

The VF sheets could be further laminated & hydraulically pressed to form approximately 600 x 400 mm sheets up to 65mm thick. These were then cut to size by customers and used as the core for industrial transformers that would last for many decades – even if the transformers were filled with an oil coolant.

Thinner sheets were used in motor windings.



***Cut edge of a vulcanised fibre laminate (circa 60 layers / 65mm thick)***

### **Mines & Pit Prop Caps:**

Steel pit props replaced the older wooden props in many coal mines as the latter were prone to rotting and collapsing. The problem with steel props was that any movement or slippage could result in a spark being produced should the steel move against the rock cavern, potentially igniting any pockets of methane . . .

The VF sheets (approx. 1.2mm thick) were die cut into circles. During further lamination & hydraulic pressing they would be moulded into a slightly domed shape blank. The blank would then be turned on a lathe, drilled for fixing bolts and sand finished for additional grip. The caps were then bolted to the top of the steel pit props. During use the VF would distort to the mine's roof contours, adding grip whilst isolating the prop from the cavern roof.



***Pit Prop Cap.***

VPM fabricated the complete 150mm diameter finished caps.

### **Sport:**

A small strip was inserted between the wooden frame at the “Y” junction of wooden tennis racquets – this allowed the racquet to flex during play without splitting or delaminating.

### **Decorative Grades:**

VPM also produced a number of decorative papers, including glycerine impregnated heavyweight parchment (120 – 140gsm). This “Cloudy VP” was mainly used for lampshades and the glycerine was added to ensure the paper remained soft and pliable. The “Cloudy” look was achieved by producing a chest of well beaten stock and a second chest of lightly brushed stock. The two stocks were mixed just before the breast box but, intentionally, not very well. This resulted in a sheet that was “Blotchy”, that is, areas that when parchmented were very low opacity whilst the brushed, poorly dispersed fibres gave high opacity. The cloudy parchment was also marketed for the manufacture of greetings cards (without the glycerine saturation).

### **Other mill features:**

During parchmentising, the sheet carried over considerable concentrated sulphuric acid into the dilute acid bath. The bath was topped up with water to ensure the acid did not become too concentrated and the overflow was fed to the acid recovery plant. This unit heated the dilute acid to boiling point, driving off the water and thus concentrating the acid for re-use.

The mill also had a fairly conventional Salle with reelers, sheeters etc. The glycerine & silicone coated papers were processed on an off-line coater. The silicone sheets displayed such low friction that stacks of cut paper would frequently fall over during counting / packaging.

### **Random Memories & Information:**

#### **Flying Splice:**

In 1966 the mill installed a flying splice onto No1 Parchmentiser. Unfortunately, the concentrated sulphuric acid usually dissolved the splice prior to it exiting the concentrated acid

bath ! Although the splice problems were gradually being resolved, the decision to close the mill stopped the unit reaching its full potential.

### **Silicon Coated Baking papers:**

The “meringue test” for checking the quality of non-stick papers was, as the name suggests, simply a case of baking meringues on the freshly coated baking grade siliconised parchment. When cooked, the paper was lifted from one edge and shaken gently . . . usually all the meringues fell off, leaving a clean sheet of paper. Even staff with a sweet tooth were unable to face yet another tray of meringues after a month or two of working at the mill !

### **Toy Drums & Tambourines:**

Vegetable parchment expanded by 15 – 20% when wet. A well known toy manufacturer decided that this property would be ideal in the production of toy drums & tambourines – apply the VP wet to the drum, fix in place and allow to shrink & dry, resulting in a “Drum tight” skin. The company was in full production ready for the Christmas sales and the instruments were despatched by British Rail. BR shunted the wagons into a siding where they stayed for several cold days and frosty nights. As the drums reached about -4°c the VP skins split with a resounding bang. BR staff contacted the toy manufacturer and told them that they believed that a wild animal was loose in the wagon!

### **Treasury & Bank Notes:**

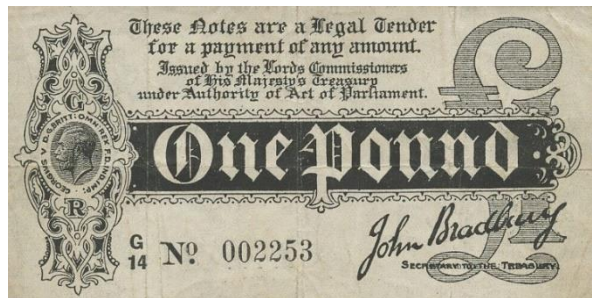
Although Banks had experimented with paper currency (as far back as the 17<sup>th</sup> century) the early



“bank notes” were hand written and included the payees name. They were in effect, individual notes written by banks – known as “Running Cash Notes”. The Bank of England commissioned some “general issue” £1 watermarked bank note blanks (handmade) in circa 1806 but they were never issued by either the Bank of England or the Government.

### **Watermarked “One” & “Bank of England” blank (circa 1806) – hand made.**

It was not until 1914 that the first UK paper currency was issued to the general public. At the outbreak of WW1, HM Government wished to call in all the gold coins and therefore issued £1.00 & 10 shilling notes, replacing gold Sovereigns and half Sovereigns.



**A “Bradbury” £1 treasury note.**

These first issue notes were not however “Bank Notes” as they were issued by John Bradbury of the treasury department – technically they were treasury notes. Joynson’s / St. Mary Cray Mill made the rag paper for these first notes and it was not until several series had been issued that

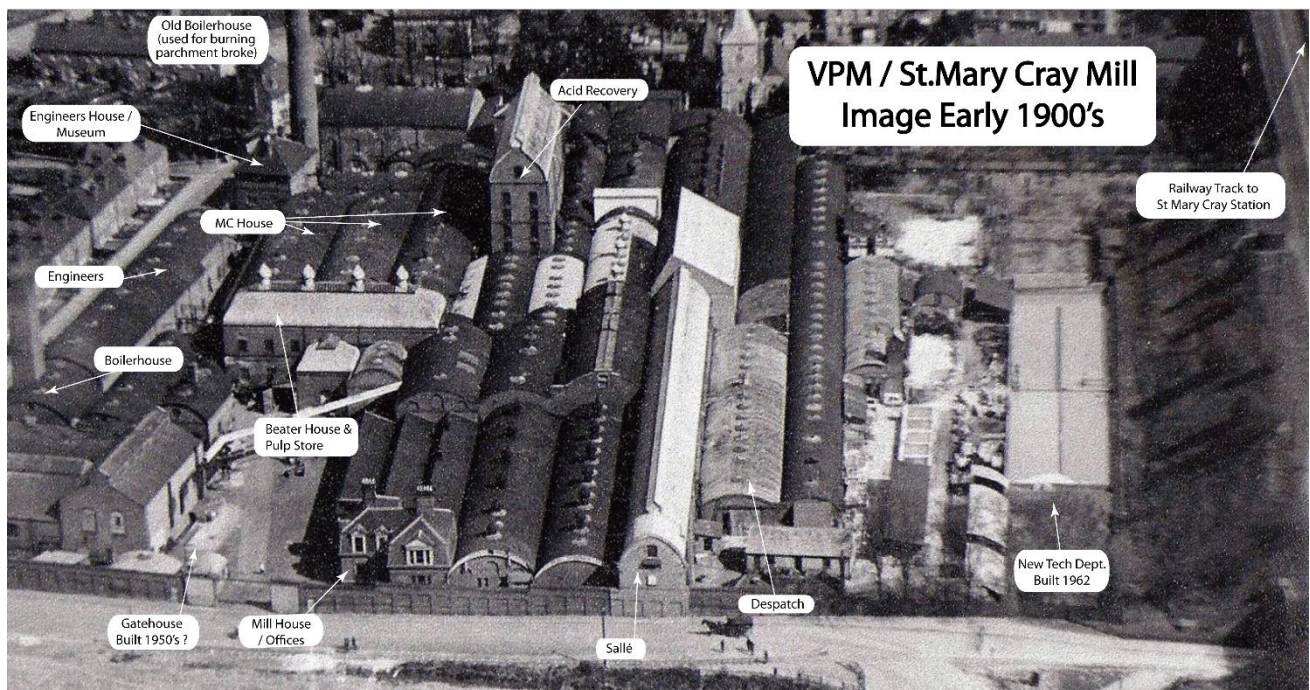
Portals took over the production for Bank Note paper. In 1928 they were issued by the Bank of England for the first time. Early paper banknotes were made from bleached rag pulps – this caused Hitler great problems when Germany tried to forge British currency (Operation Bernhard). The German notes were initially printed on paper produced from virgin cotton linters, which had a totally different feel and rattle to bleached recycled rag papers !

Between the wars, old banknotes, which were taken out of circulation, were destroyed in the St. Mary Cray mill's two Lancashire boilers.

The very first series of notes were printed on Stamp paper, at that time made by St. Mary Cray Mill – it was a quick solution and the mill was seen to be secure (it had a 10 - 14ft high wall surrounding it). The wall can clearly be seen in the photograph.

During my time at the mill, one employee, George Wilkinson, had been employed in production since he was 14 years old and upon retirement, immediately returned as odd job man / cleaner for the Technical Department. George was born in 1887 and therefore commenced working at the mill in 1901. He was nearly 80 years old when the mill closed. George was all too eager to regale us with past stories of the mill – how his wife had been employed to remove buttons, out-sort the silk and woollen fabrics, and wash heavily soiled rags. The air was frequently thick with dust as some rags were mechanically “cleaned”. How the mill had been “invaded” by government inspectors when banknote paper was being made. The inspectors would follow the product through its various stages – “watching, measuring and weighing everything” . . . and how one of his jobs was to throw bundles of decommissioned banknotes into the Lancashire boilers - again under the watchful eye of security personnel !

How I wish I'd listened more attentively to stories from this bygone age !

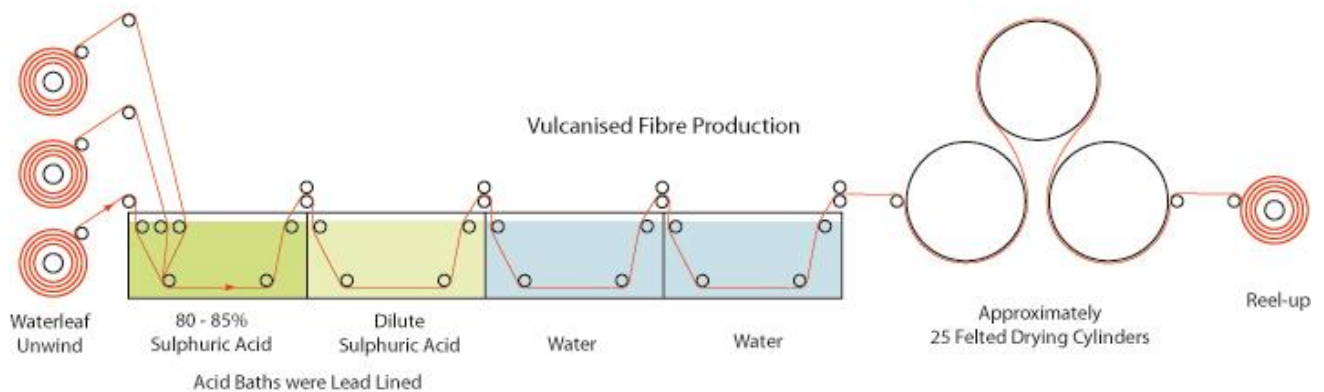
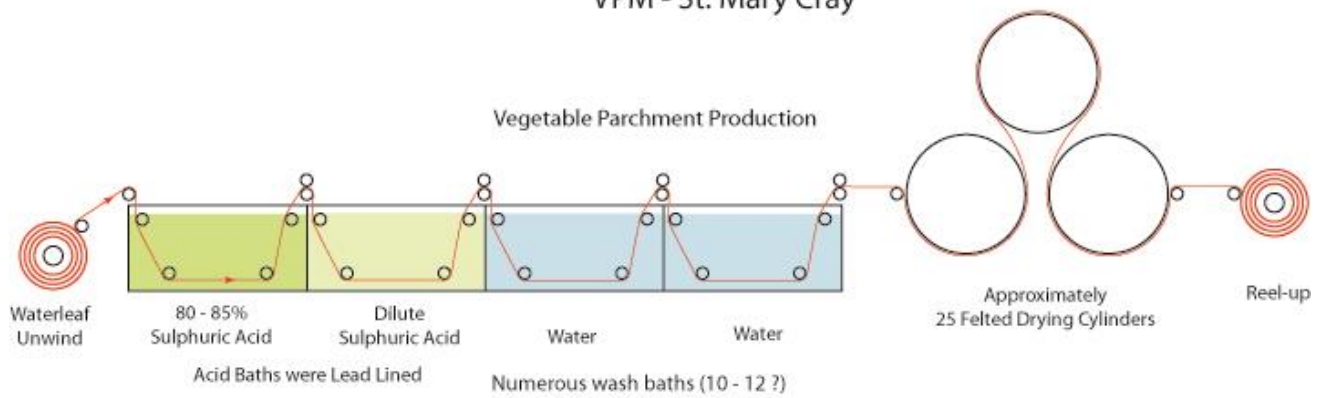


**Rob Clarke 2024**

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## Appendix 1 – Parchmentising Schematic

VPM - St. Mary Cray



Schematics

### VPM's main manufacturing plant consisted:

One 2.4m Fourdrinier machine.

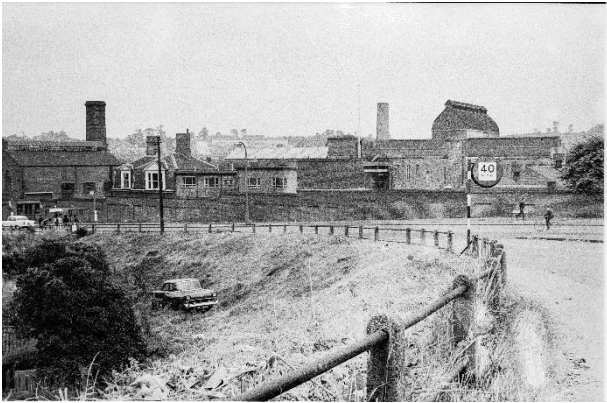
Two Parchmentisers.

Two Vulcanised Fibre machines.

One Silicone / Glycerine coating machine.

All conversion machinery ran full deckle reels (circa 2.2m).

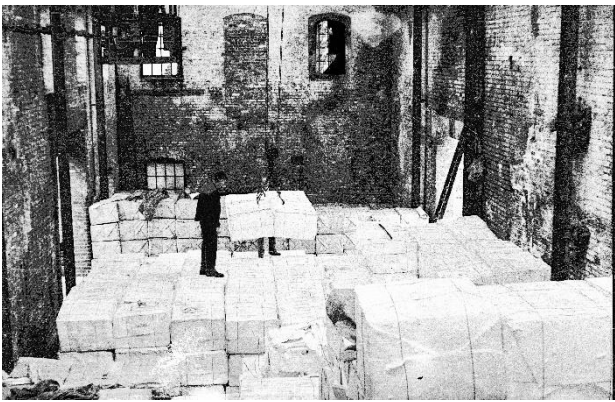
Images from 1967



VPM from Station Approach.



VPM - The Main Gate (pulp store ahead).



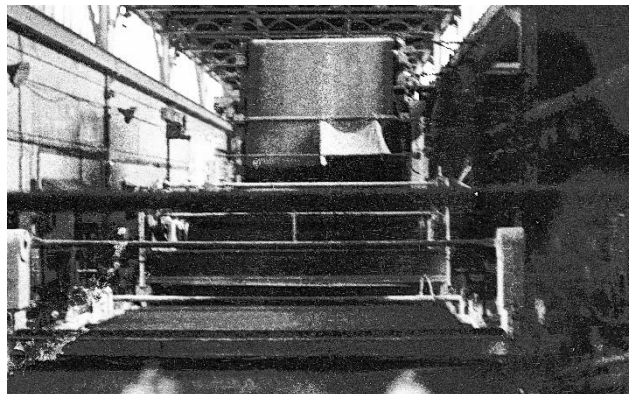
VPM – The Pulp Store.



VPM The old Tech Dept / Archives.



VPM – Effluent discharge to the “Tin River”  
(the old mill leat).



VPM Papermachine - from the Breastbox.  
(Making Vulcanised Fibre Base).