A Papermaker's tale of End Papers

Making Renaissance Toilet Paper

Preface

End-paper or, rather, paper for wiping your rear end was probably not a standard bathroom accouterment in the Renaissance. If available, it was used by the very well-to-do (paper was expensive 500 years ago.) Possibly discarded hemp wrapping paper was used more widely in the loo. After all, reports of just about anything, from old rope to corn cobs, a goose's soft feathered neck, or one's hand, was reportedly put to good use in the water closet.

Today, toilet paper is a necessity, such a common commodity that a 21st-century plague has lead to the hoarding of the soft tissue. Scatological shoppers have cued for hours to purchase a few rolls. It is unlikely that you would find contemporary hand papermakers standing in line at a supermarket, hoping to snag the last roll of toilet paper. For paper artisans, making toilet paper is crazy-easy and takes very little raw material.

The maker of fine paper might acquire raw material for toilet paper from any number of sources, possibly cooking their own bast fiber in an alkali or purchasing half-stuff from a supplier. The later is the easiest approach, and cotton linters the softest choice. For TP they would start by soaking linters for an hour or more to soften the fibers. Next, in a Hollander beater (or blender), they would efficiently and easily "clear" the fiber (i.e., blend the fibers in water without beating - keeping a big gap between flybars and bedplate) dispersing the fibers. They would not add sizing since the goal is to make a very absorbent paper. With a diluted furnish, thin sheets would be formed and couched onto felts where they would be allowed to air dry without pressing (to keep them soft and fluffy). A few hours of work would keep these artisans in TP for a week.

In the following pages, I depart from this logical approach, turning away from the Industrial Revolution's cotton linters and I choose the 15th-century fiber, hemp. I'll use an antique-style laid paper mould, couch on heritage felt, and use precise measurements to make a soft Renaissance style TP.

-Donald Farnsworth

Toilet paper and the COVID-19 plague of 2020

Sheltering-in-place and/or fleeing the city in an attempt to avoid the plague is a reoccurring saga of our species. At the same time, hoarding, shortages, and misinformation seem to be a common theme throughout this history. In a gesture of solidarity with our suffering 15th c. ancestors, I will make the commonly hoarded product, *toilet paper*, but not just any TP, Renaissance plague victims toilet paper. For comfort, while wiping, I include some 21st-century refinements to the process to create a soft, usable 15th c style TP; after all, no need to flail any more than is necessary. Therefore, let's analyze some 21st-century toilet paper to see what weight (expressed in grams per square meter) is currently working for our collective derrières.

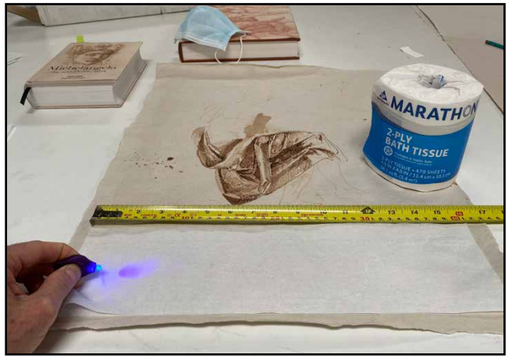
Evaluating a contemporary roll of toilet paper that performs well at the toilet will help to find the prevailing standard of **weight**, **softness**, and **absorbency** for our Renaissance tissue to emulate:

For my 21st-century tissue of choice, I chose *Marathon 2 ply*, for the simple reason that it contains no optical brightening agents (OBAs). Optical brighteners are polluting our planet, modifying our aquatic life, and so obviously unnecessary. Sadly, consumers continue to use *Tide*, purchase tainted garments, plastic, and paper products poisoned by corporations like Proctor & Gamble, BASF, Eastman Kodak, Akzo Nobel, and Huntsman International.

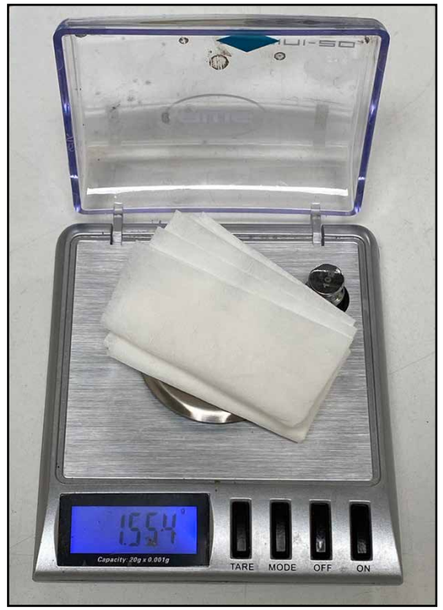
If you are lucky enough to possess a roll of TP in this time of plague, tear off a square in bright sunlight and watch the fine cellulose dust floating in the air. Like COVID-19, it is nothing you would want to breathe into your lungs. After all, cellulose dust, a known pulmonary toxin, is likely more toxic when impregnated with dyes, perfumes and optical brightening agents. Having bright-white toilet paper is not worth braving the hazards of inhaling cellulose fibers infused with molecules built of benzene rings. It is true that brighteners do make clothes, officer paper and toilet paper whiter in appearance (OBAs absorb UV light and emit it back in the visible spectrum). It also just happens to change the sex of frogs. That is, if the tadpoles were male when exposed to OBAs, they turn to females. If your toilet paper of choice is optically brightened or not, you might consider wearing your COVID-19 N95 mask while perched on your throne (toilet).

Finding TP's weight (in grams per sq meter)**:**

Tearing four squares of tissue from the Marathon roll, I measured their length and width and arrived at 41cm x 11.5cm. At the same time, I also double-checked that the tissue, as I have claimed, is not optically brightened.

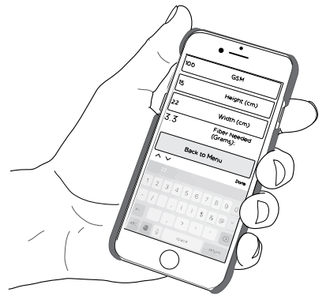


I did this by shining a UV light on the surface, sure enough, it reflected purple (not blue) - good.



Next, I weighed the four sections of TP and arrived at a weight of 1.55grams. These two measurements, weight and dimensions, allow us to calculate the grams per square meter of the 2 ply toilet paper.

Using the app, *PaperWeight*, downloaded from www.magnoliapaper.com, I clicked the menu "*Rectangle Dimensions to GSM*" and deftly calculate the grams per square meter, without searching the nooks and crannies of my mind for a formula.



I discover that 2ply TP weighs 32.66 grams per square meter. That is, if you had one sheet of toilet paper that was one meter by one meter (39.37in. x 39.37in.), it would weigh 32.66 grams (1.15oz.)

1.54	Mass (grams)
41	Height (cm)
11.5	Width (cm)
32.662	Grams per Square Meter

Next, I need to know how much dry fiber is required to make a sheet of paper of that weight. Specifically, how much hemp fiber is required in order to make a sheet of paper with a dimension of 14.6cm x 21cm (5.75in. x 8.25in.), for that is the size sheet made by the mould I have chosen to employ - an adequate size with which to wipe

32.66	GSM
14.6	Height (cm)
21	Width (cm)
1.001	Fiber Needed (Grams):

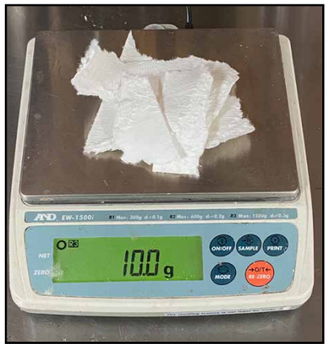
my rear end. For that calculation, I go the menu in *PaperWeight* "GSM Pulp Required (Rect)." There, I plug in my numbers and learn that I need 1g of fiber per sheet - how convenient.

Hemp: Have our derrières evolved over these past 500 years to become more sensitive to abrasion? The Renaissance choice of hemp as the fiber of choice for wiping might seem like sandpaper to us modern humans. Hemp is a strong, robust bast fiber and might produce a brutal and uncomfortable TP. These days hemp is used to make a variety of commercial and industrial products, including rope, textiles, shoes, food, bioplastics, biofuel, and paper (rolling paper, tea bags and bank notes). We will have to process this robust fiber with a gentle hand to keep it soft.

I am using Spanish hemp from the Provence of Tarragona. Fitting, in that paper was introduced to Europe by the Moors who settled the Iberian Peninsula. I am lucky enough to have 200kg (441 lbs) of hemp half stuff I imported a couple of years ago. With such a quantity, my family and friends will never be intimidated by TP hoarders or lack of confidence on the toilet.

The Process - making Hemp Toilet Paper

As calculated (above), 1g of hemp makes 1 sheet of 32.66g/m2 TP. Wishing to make ten sheets, I weigh out 10g of dry hemp half stuff.

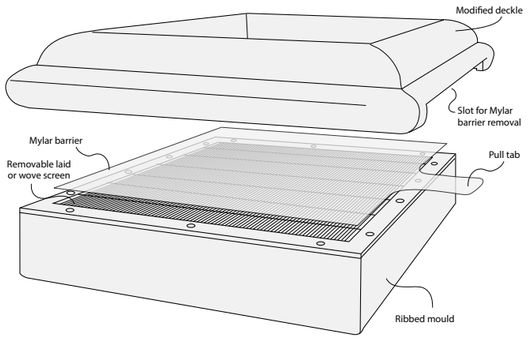


After soaking the 10g of half stuff for an hour in 1 liter of water, I blend the hemp thoroughly, adding a little formation aid (a slimy starch used in Japanese papermaking - aka tororo) at the end of the blending.

Because of the sensitive nature of the orifice we will be wiping with this paper, we are hoping for an outcome of soft paper. We will, therefore, not be using a Hollander beater or any other industrial processor that might hydrate and fibrillate the hemp. Any additional fibrillation would make our sheets excessively hard, crisp, rattly, and not so absorbent - undesirable characteristics in this situation; indeed, a blender will suffice.

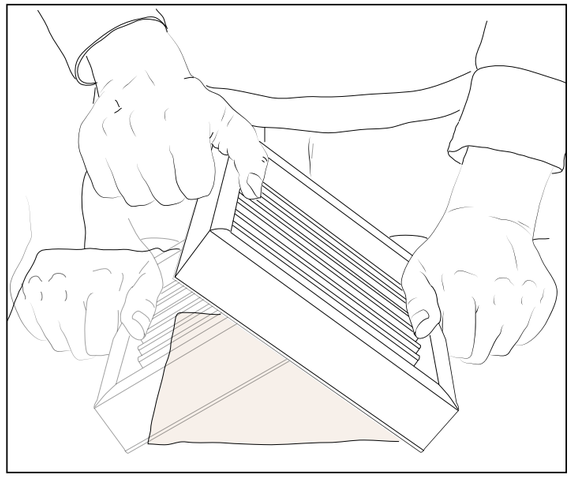
So now we have 10g of fiber blended in 1 liter of water; therefore, each 100ml makes 1 sheet. However, we need to dilute this pulp as 100ml is too concentrated to allow for proper sheet formation. So, to proceed, I dilute the pulp with another 4 liters of water (and a bit more formation aid) to make my furnish. We use no sizing of any sort; we want this paper to be absorbent for apparent reasons. Now diluted, 500ml makes 1 sheet of TP weighing out at 32.66 g/m2.

Above: With five liters of furnish (in the bucket) and using a glass beaker, we measure out 500ml of furnish per sheet. This mould and deckle we are using is designed so that we can form sheets without the need of a vat.



To make a sheet of a specified g/m2: The high walled deckle can easily accommodate 500ml of furnish while the pull-out mylar barrier prevents the furnish from draining. The mylar remains in place until the entire 500ml of furnish is added. At that moment, the mylar is deftly slipped out, and the pulp begins to drain. Quickly we shake the mould to settle the fibers - in an instant, the sheet has formed with no spillage or uncertainty; 500ml = 1g (perfect).

Couching:



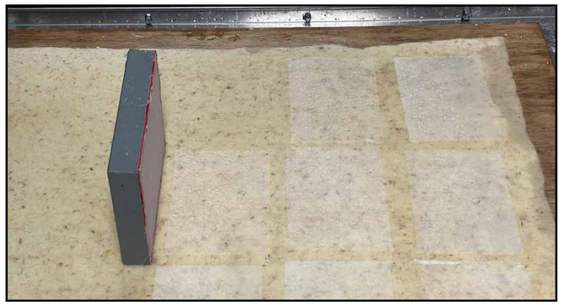
Couching - transferring a newly formed sheet from the paper mould to a felt

In the spirit of Renaissance paper, I am using a laid paper mould - albeit made from 3D printed plastic.

A closer look at the laid pattern on a freshly couched sheet of Renaissance TP.

The laid screen covering on the mould gives our Renaissance TP a very nice look-through.

Once the sheet is formed and because the sheet is thin (it is, after all, toilet paper), it must be quickly couched while the entrapped fibers on the screen still retain plenty of water.



In the spirit of making authentic 15th-century toilet paper, the felts I am couching on are made from wool, with an ancient European heritage. In 2016, on a quest to find coarse wool from sheep whose DNA had not changed since the Renaissance, I traveled to Italy with my wife, Era, and met with our good friend Elizabeth Wholey and her neighbor Gianni Berna, the latter an Italian alpaca shepherd, living not far from the early papermaking city of Fabriano. On my behalf Gianni contacted Carlo Renieri (a member of several wonderfully-named International Societies including Anthropozoologica and COGNOSAG: the Committee on Genetic Nomenclature of Sheep and Goats), who directed us to the Fabrianesi and Apenninica breeds, both breeds in possession of DNA which has not changed for half a millennium. A good friend of Gianni and Elizabeth, Italian felt artist Cristina Biccheri made felts from these very breeds, which we now use for our Renaissance TP.

Two of the sheets I made using 2g of fiber per sheet to experience the luxuries of heavyweight TP. (Above: one is on the lower left and the other is on the mould.)

The ten 1g sheets (32 g/m2) and the two more substantial sheets are formed and couched; they next are covered with another felt, then boards, and slid into the hydraulic press where 50 tons of pressure is applied, squeezing out a trickle of water.

After a few minutes under pressure, we extract the stack of boards and felts from the press and expose our sheets, ready to be air-dried.

Folding back the felt I could see the paper looks fabulous. But with the paper so thin, I imagine it might be hard to handle while wet as I lift each sheet from the felt.

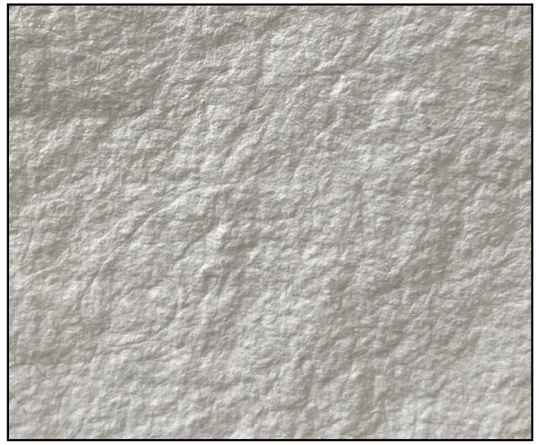
After pressing, it's best to release the paper from the felt rather than letting them dry stuck to the felt. Handling wasn't too bad, I only lost one sheet to poor handling, the sheet flopped as I lifted it and stuck to itself and became too much of a wad to untangle. I let the sheets dry on a slightly damp felt to keep the drying process slow.

The next day the sheets were dry. They look and feel fantastic and although not as quite as soft as the Marathon 2 ply, fairly soft by 15c standards, I would imagine, since they were more accustomed to wiping with corn cobs and hemp rope. The heavier 2 gram sheets were

too firm, not likely to conform to the curvatures necessary for a good wipe.

The grams per square meter came in right-on-target, with each sheet weighing 1g, equal to 32.66 g/m2.

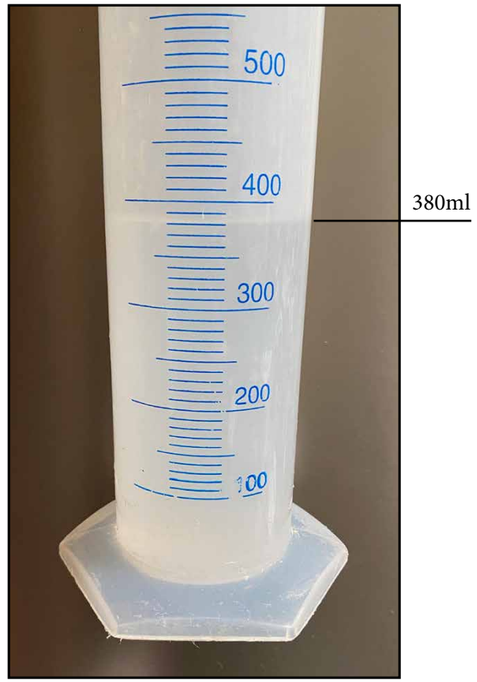
Furthermore, the texture is exquisite. The surface in raking light displayed the rich texture of a 15th-16th-century paper to the nth degree. Felt hair marks and detail any Old Master would enjoy as a surface for red, black, and white quarried chalk.



My throne of choice is Japanese - a Toto water-saving toilet with an S350e Washlet (a sort of bidet). This particular model has a built-in blow dryer - if you are patient, one could avoid toilet paper altogether. However, "dabbing" off after a hose down with the Washlet does save time and inspires confidence. The average toilet uses 4 gallons to flush. Toto uses either a ⅓ gallon to flush or 1.6 gallons for a serious flush.

Americans use billions of rolls of toilet paper every year, pulping millions of trees. It takes energy, water, and tons of chemicals - So I say, wash more and flush less (and get your gray water system up and running).

Testing Freeness:

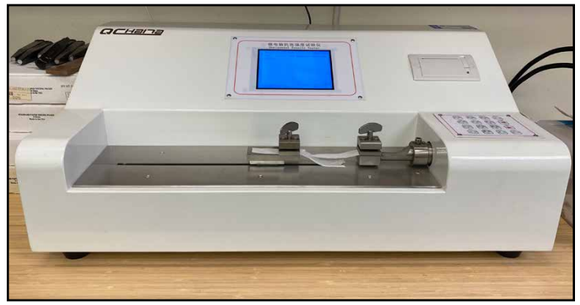


Freer furnish (a processed pulp that drains quickly) usually results in a softer paper. With a Wester fiber, like cotton, a freer pulp can be made by beating for a shorter period of time (less processing). The same is somewhat true for bast, inner bark type of fibers, but as important as processing for these fibers is the cook. Kozo, for example, can be made softer by cooking the bark for a longer duration and in a harsher or higher concentration of alkali. A harsh cook strips away more hemicellulose, a component of bast fibers that help bond the fibers. Whereas a gentle cook leaves more hemicellulose intact, and that increase in bonding potential results in the crisper and rattly Japanese style paper we know and love.

With the soft tissue paper we managed to achieve, it would be nice to know the freeness of the pulp we made it with, so when we make more TP (and more TP is always required if the our bodies is functioning properly) we know the target freeness:

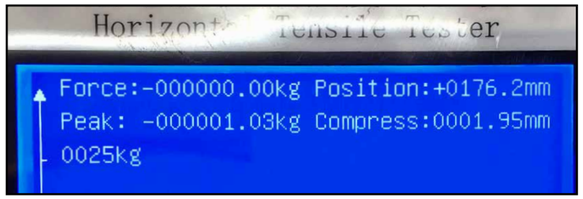
To find the freeness of our blended hemp pulp, I dispersed 3g in a liter of water. Next, I pour the liter of pulp into the holding tank at the top of the Canadian Standard Freeness Tester. Opening in the bottom restraint, and releasing the top valve, the water drains as a speed commensurate with the amount of processing the fibers received. With faster draining pulp, more of the drain water diverts into the graduated cylinder, with slower draining pulp less water flows to the graduated cylinder. The freeness we achieved is 380 ml or 380 CSF.

Testing: Tensile Strength tests:

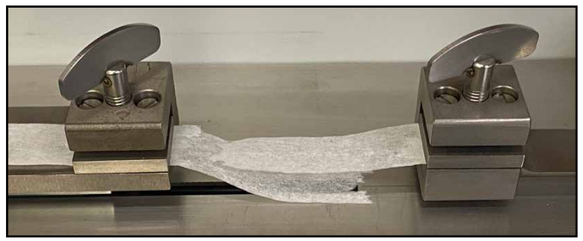


As far as tensile strength, as you might think, the hemp paper has a distinct advantage.

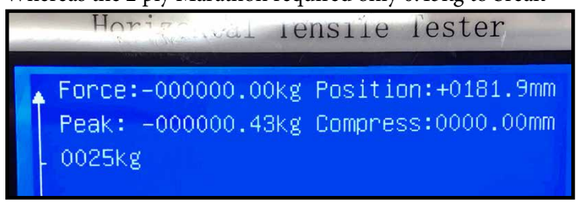
The hemp required the force of about 1.0kg to break



Marathon 2 ply:



Whereas the 2 ply Marathon required only 0.43kg to break



Initial water droplet test indicate that our 15th-century paper absorbs water like a champion. For a more refined predictor of absorption (see *Cobb test* on the following page).

Dispersion Test: Samples weighing 0.6g were placed in a blender with 1 liter of water and blended for 10 seconds at the lowest RPM. Both the Renaissance TP and the Marathon 2ply disintegrated completely.

Cobb Test: Water absorbency (g/m2)

For the standard test area of 100 cm2, subtract the dry weight of the specimen from its final wet weight, and multiply the gain in weight in grams by 100 to obtain the weight of water absorbed in grams per square meter:

Marathon 2 ply = 0.9g (wet) - **0.4g** (dry) **x 100 = 50g/m2**

Renaissance TP = 1.0g (wet) - **0.5g** (dry) **x 100 = 50g/m2**

The absorption rate for both Marathon 2ply (our 21st-century target sheet) and the Renaissance TP is **50g per square meter**. That is, a square meter of either paper will absorb 50g of water in less than 30 seconds. Whether dabbing or wiping, both TPs should perform splendidly – or should I say adequately; can the act of wiping your ass ever be described as splendid?

Process:

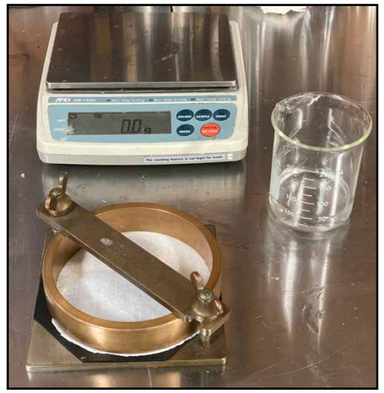
1. Cut samples to the diameter of the outer edge of the cobb Tester - do the same for both samples.

2. Weigh the samples in their dry state.

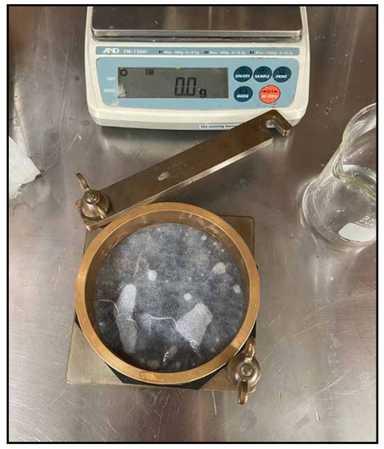
Renaissance TP - dry

Marathon 2ply -dry

3. Clamp each sample into Cobb tester.



4. Pour in 100ml of water



5. Pour off the water after 30 seconds and remove the sample

6. Blot sample

7. Weigh the samples in their damp state

Renaissance TP -wet

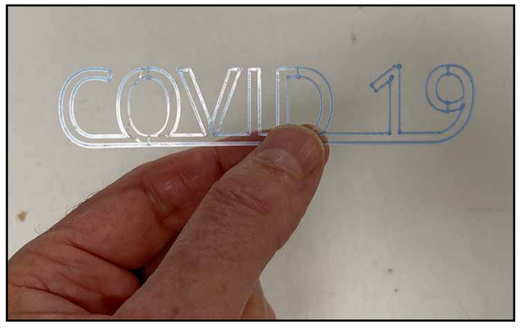
Marathon 2ply -wet

Commemorative COVID-19 Toilet Paper - *A perfect 15th-century wipe every time.*

After the initial tests mentioned above, I proceeded on a course of making a small production run of ***Commemorative COVID-19 Toilet Paper***. I designed a wire-watermark in a vector-based program suitable for a small laid 3D printed mould.

Master Printer Nicholas Price prepared the design, extruding, and defining a machine path suitable for 3D printing. He printed the watermark at Magnolia Editions on a Fusion3 using PLA (Polylactic Acid) filament. The first test was a solid, infilled watermark, which was likely to be too heavy for toilet paper, making too large of a weak area - a higher likelihood of a break-through when wiping. Reworking the vector for printing, Nicholas perfected a file with the inner arcs of the O, D, and 9 attached to the outer wire. Now, when printed, the centers had integrity.

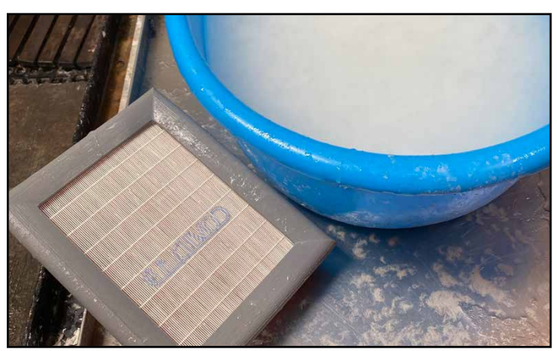
I fastened the PLA wire-style-watermark to the mould surface with spray cement and twists of brass wire.



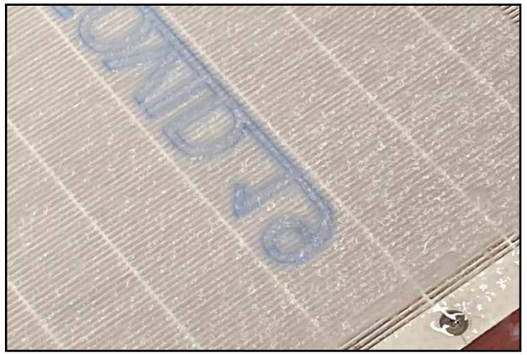
Preparing the furnish in a larger quantity than the 10g blender tests, I soaked and cleared 360g of hemp half stuff (no beating) to make free pulp, with the goal of a soft result. Once diluted in a small vat, I made thirty test sheets. Then I dried and weighted the sheets to determine if the vat concentration was correct. Success? Well, no. The first thirty sheets I made weighed in at a formidable 2.5g - More than twice the desired GSM - stiffer and scratcher than the target 1g.

Gargantua rejects such paper (see p. 16)

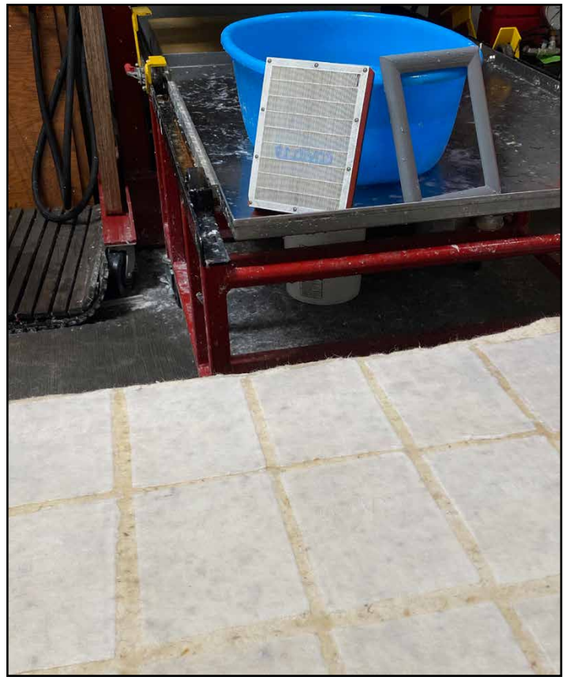
Attempting to make thinner sheets with the same furnish and laid mould proved easy to form but impossible to couch. Borrowing from the Japanese papermaking tradition, I added additional formation aid and added a “sealing” dips (kumikomi) at the start of each sheet. A sealing dip sends the furnish swooshing, from front to back of the mould, aligning the fibers perpendicular to the wire lines allowing for a successful couch of such a very thin sheet.



Slowly I zeroed in on a 1g sheet. The newly formed sheet below weighed in at 1.2g when dry. Practice make perfect.



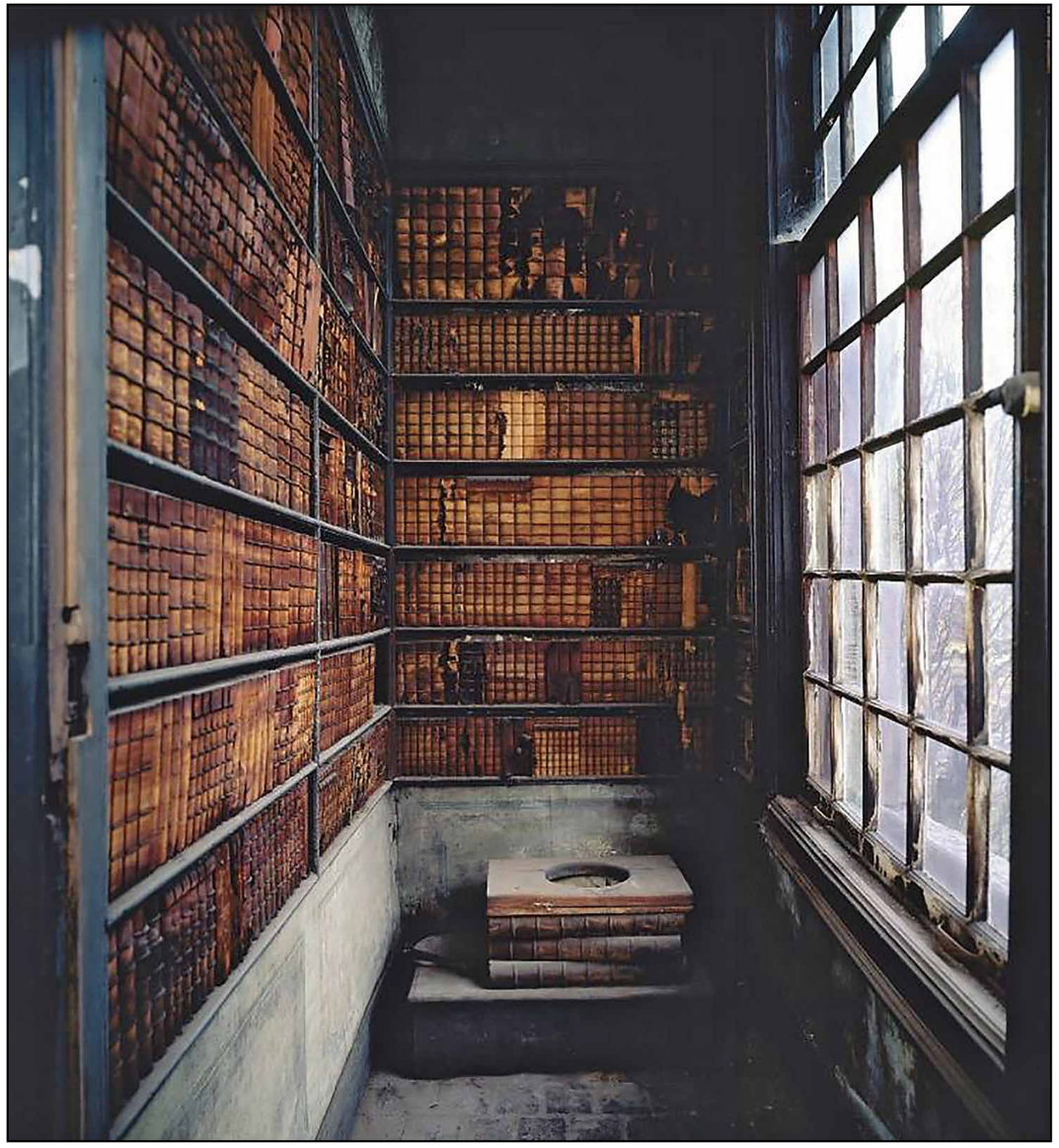
In the image below: On the left are 15 newly couched sheets that weigh 1.2g dry, whereas the earlier hand sheets made at a vat (photo on the right) average a hefty 2.5g. Care must be taken to achieve a constant thin, and well-formed sheet. Remember, our target toilet paper should weight about 1g per sheet (32.66 g/m2).



Conclusion:
Imagine my surprise when this tongue-in-cheek project exceeded my wildest expectations. The resulting paper is equal to or, I hesitate to say, superior to commercial toilet paper, durable and substantial yet (except for the thicker test sheets) soft and accommodating. Wiping or blotting, it performs like a dream - rarely breaking - a pleasure to use.

- xo, Don

End Sheets: Toilet paper tidbits



18th Century (stack of books) toilet. The Hofkamer's bathroom - plenty of reading material.

The flush toilet first invented by Sir John Harington in 1569
Toilet paper was used in China from around the late 6th century.

Gargantua and Pantagruel, by Francois Rabelais (excerpt - the First Book, first published in 1532)
Translation: Sir Thomas Urquhart of Cromarty and Peter Antony Motteux

What follows is a cautionary tale of using paper as the article of choice for wiping - written in 1532. The "chips" comment (in bold below) leads me to believe that wrapping paper was the culprit. A cheap paper made by apprentices using low-grade rags, leftover pulp, and paper mill floor sweepings - could leave splinters. – Don

Chapter 13

About the end of the fifth year, Grangousier returning from the conquest of the Canarians, went by the way to see his son Gargantua. There was he filled with joy, as such a father might be at the sight of such a child of his: and whilst he kissed and embraced him, he asked many childish questions of him about divers matters, and drank very freely with him and with his governesses, of whom in great earnest he asked, amongst other things, whether they had been careful to keep him clean and sweet. To this Gargantua answered, that he had taken such a course for that himself, that in all the country there was not to be found a cleanlier boy than he. How is that? said Grangousier. I have, answered Gargantua, by a long and curious experience, found out a means to wipe my bum, the most lordly, the most excellent, and the most convenient that ever was seen. What is that? said Grangousier, how is it? I will tell you by-and-by, said Gargantua. Once I did wipe me with a gentle-woman's velvet mask, and found it to be good; for the softness of the silk was very voluptuous and pleasant to my fundament. Another time with one of their hoods, and in like manner that was comfortable. At another time with a lady's neckerchief, and after that I wiped me with some ear-pieces of hers made of crimson satin, but there was such a number of golden spangles in them (turdy round things, a pox take them) that they fetched away all the skin of my tail with a vengeance. Now I wish St. Antony's fire burn the bum-gut of the goldsmith that made them, and of her that wore them! This hurt I cured by wiping myself with a page's cap, garnished with a feather after the Switzers' fashion.

Afterwards, in dunging behind a bush, I found a Marchcat, and with it I wiped my breech, but her claws were so sharp that they scratched and exulcerated all my perinee. Of this I recovered the next morning thereafter, by wiping myself with my mother's gloves, of a most excellent perfume and scent of the Arabian Benin. After that I wiped me with sage, with fennel, with anet, with marjoram, with roses, with gourd-leaves, with beets, with colewort, with leaves of the vine-tree, with mallows, wool-blade, which is a tail-scarlet, with lettuce, and with spinach leaves. All this did very great good to my leg. Then with mercury, with parsley, with nettles, with comfrey, but that gave me the bloody flux of Lombardy, which I healed by wiping me with my braguette. Then I wiped my tail in the sheets, in the coverlet, in the curtains, with a cushion, with arras hangings, with a green carpet, with a table-cloth, with a napkin, with a handkerchief, with a combing-cloth; in all which I found more pleasure than do the mangy dogs when you rub them. Yea, but, said Grangousier, which torchecul did you find to be the best? I was coming to it, said Gargantua, and by-and-by shall you hear the tu autem, and know the whole mystery and knot of the matter. I wiped myself with hay, with straw, with thatch-rushes, with flax, with wool, with paper, but,

Who his foul tail with paper wipes,
Shall at his ballocks leave some chips.

What, said Grangousier, my little rogue, hast thou been at the pot, that thou dost rhyme already? Yes, yes, my lord the king, answered Gargantua, I can rhyme gallantly, and rhyme till I become hoarse with rheum. Hark, what our privy says to the skiters:

Shittard,
Squirtard,
Crackard,
Turdous,
Thy bung
Hath flung
Some dung
On us:
Filthard,
Cackard,
Stinkard,
St. Antony's fire seize on thy toane (bone?),
If thy
Dirty
Dounby
Thou do not wipe, ere thou be gone.
Will you have any more of it? Yes, yes, answered Grangousier.
Then, said Gargantua,
A Roundelay.

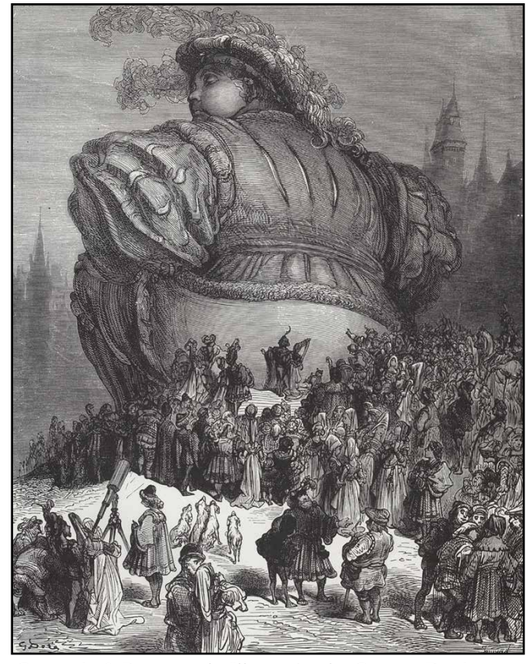
In shitting yes'day I did know
The sess I to my arse did owe:
The smell was such came from that slunk,
That I was with it all bestunk:
O had but then some brave Signor
Brought her to me I waited for,
In shitting!
I would have cleft her watergap,
And join'd it close to my flipflap,
Whilst she had with her fingers guarded
My foul nockandrow, all bemerded
In shitting.

Now say that I can do nothing! By the Merdi, they are not of my making, but I heard them of this good old grandam, that you see here, and ever since have retained them in the budget of my memory.

Let us return to our purpose, said Grangousier. What, said Gargantua, to skite? No, said Grangousier, but to wipe our tail. But, said Gargantua, will not you be content to pay a puncheon of Breton wine, if I do not blank and gravel you in this matter, and put you to a non-plus? Yes, truly, said Grangousier.

There is no need of wiping one's tail, said Gargantua, but when it is foul; foul it cannot be, unless one have been a-skiting; skite then we must before we wipe our tails. O my pretty little waggish boy, said Grangousier, what an excellent wit thou hast? I will make thee very shortly proceed doctor in the jovial quirks of gay learning, and that, by G—, for thou hast more wit than age. Now, I prithee, go on in this torcheculative, or wipe-bummatory discourse, and by my beard I swear, for one puncheon, thou shalt have threescore pipes, I mean of the good Breton wine, not that which grows in Britain, but in the good country of Verron. Afterwards I wiped my bum, said Gargantua, with a kerchief, with a pillow, with a pantoufle, with a pouch, with a pannier, but that was a wicked and unpleasant torchecul; then with a hat. Of hats, note that some are shorn, and others shaggy, some velveted, others covered with taffeties, and others with satin. The best of all these is the shaggy hat, for it makes a very neat abstersion of the fecal matter.

Afterwards I wiped my tail with a hen, with a cock, with a pullet, with a calf's skin, with a hare, with a pigeon, with a cormorant, with an attorney's bag, with a montero, with a coif, with a falconer's lure. But, to conclude, I say and maintain, that of all torcheculs, arsewisps, bumfodders, tail-napkins, bunghole cleansers, and wipe-breeches, there is none in the world comparable to the neck of a goose, that is well downed, if you hold her head betwixt your legs. And believe me therein upon mine honour, for you will thereby feel in your nockhole a most wonderful pleasure, both in regard of the softness of the said down and of the temporate heat of the goose, which is easily communicated to the bum-gut and the rest the inwards, in so far as to come even to the regions of the heart and brains. And think not that the felicity of the heroes and demigods in the Elysian fields consisteth either in their asphodel, ambrosia, or nectar, as our old women here used to say; but in this, according to my judgment, that they wipe their tails with the neck of a goose, holding her head betwixt their legs, and such is the opinion of Master John of Scotland, alias Scotus.



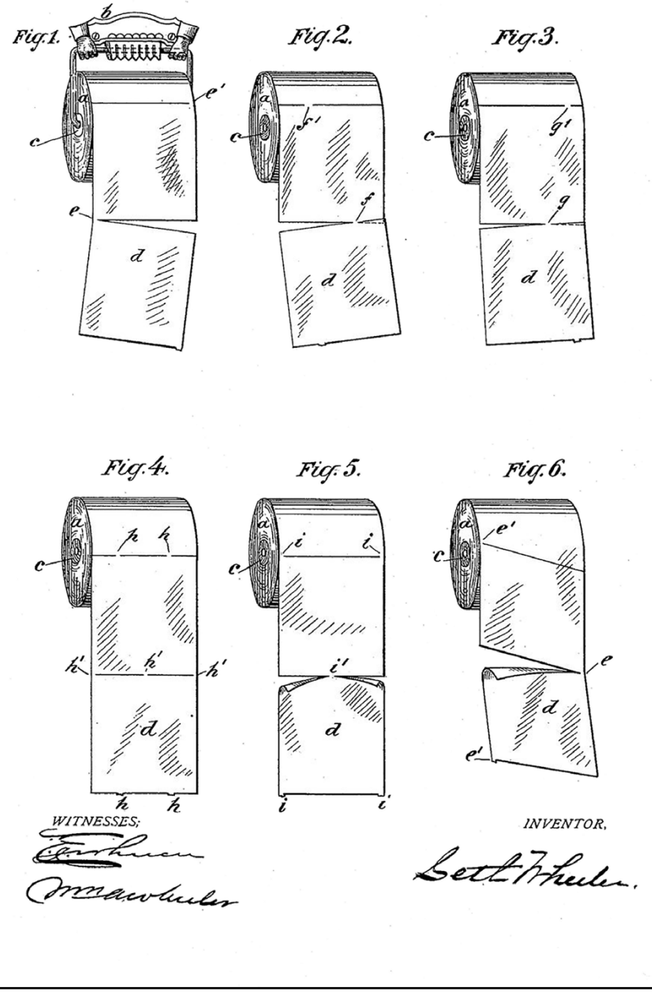
Garganúa & Pantagruel - Illustration by Gustave Doré

(No Model.)

S. WHEELER.

WRAPPING OR TOILET PAPER ROLL.

No. 459,516. Patented Sept. 15, 1891.



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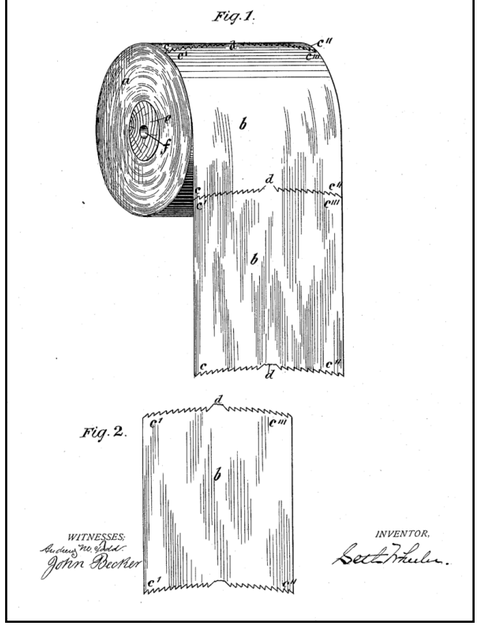
In 1857, Joseph Gayetty of New York marketed a "***Medicated Paper, for the Water-Closet***," packages of 500 sheets cost 50 cents (about $13.50 in today's dollar). (Image: Library of Congress)

(No Model.)

S. WHEELER.

TOILET PAPER ROLL.

No. 465,588. Patented Dec. 22, 1891.



Sheets not rolls: toilet paper on a roll made its appearance in the late 19th-century - Patented by S. Wheeler in 1891, and, therefore, (as far as we know) were not available for purchase during the Renaissance.

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