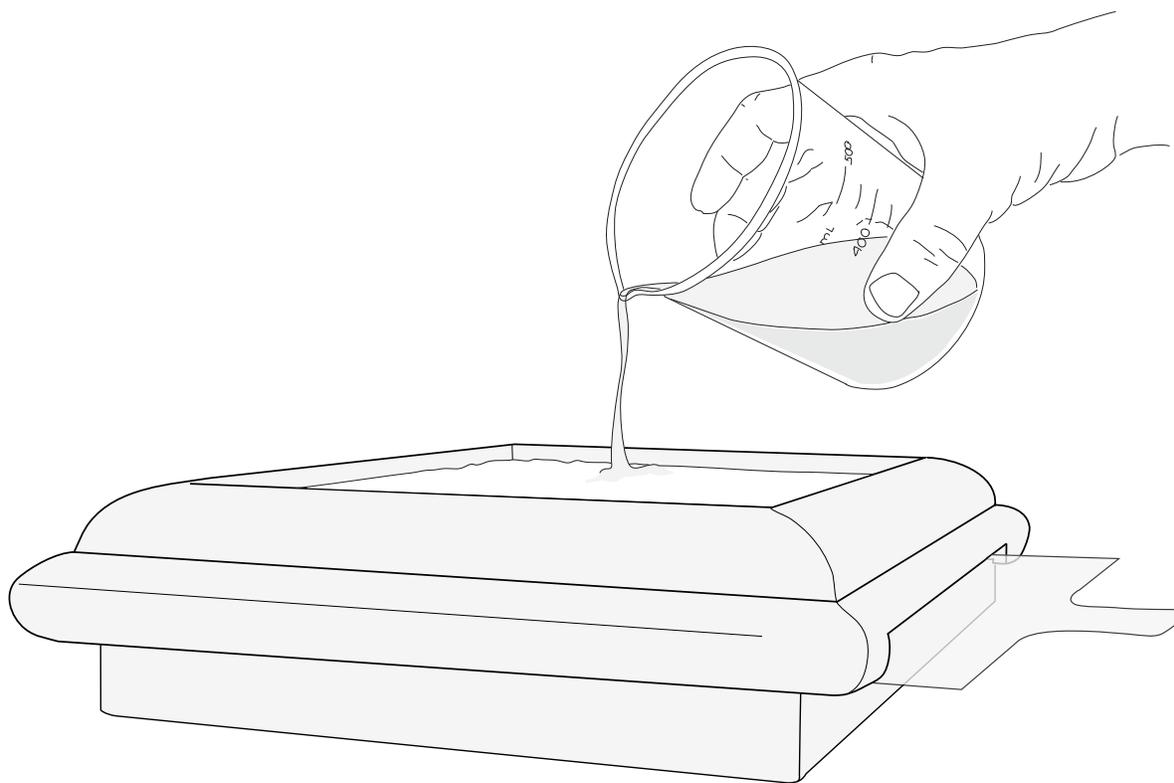


Determinate Hand Papermaking

VIII

Sheet Formation without a Vat

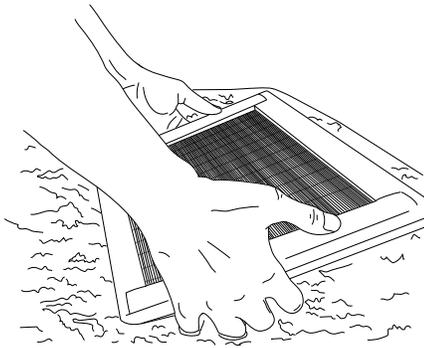
with a predetermined quantity of furnish



Text and illustrations by
Donald Farnsworth
2017

Determinate papermaking with a traditional ribbed mould and deckle

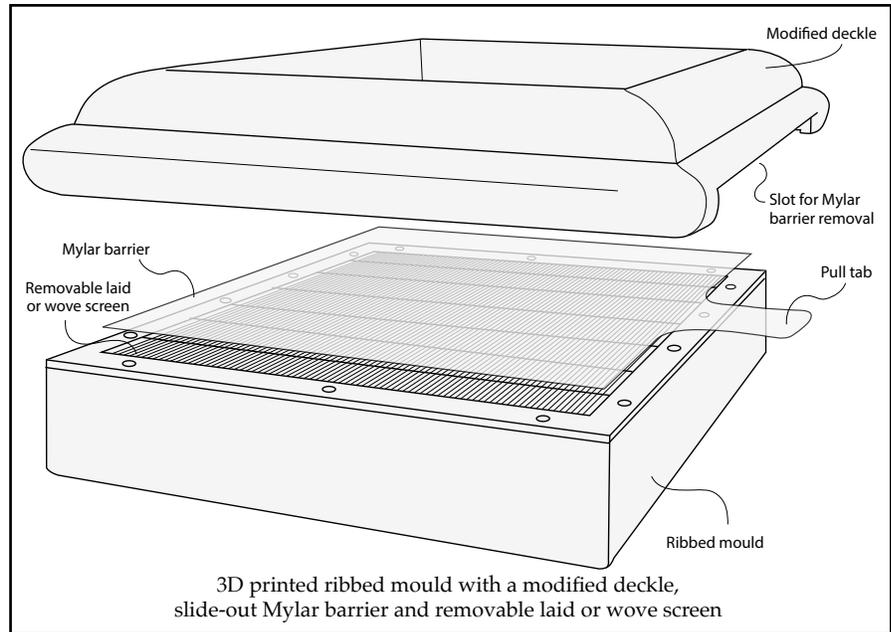
Forming a sheet on a traditional Western mould involves dipping the mould into a vat of furnish, scooping an estimated quantity into the boundaries of the deckle, and forming sheets; experience increases the likelihood of making a sheet that hews to an intended weight. To make a determinate, known-gsm-weight paper on this type of mould requires a re-design of the deckle in a somewhat modified “deckle box” technique.



Traditional vat sheet forming



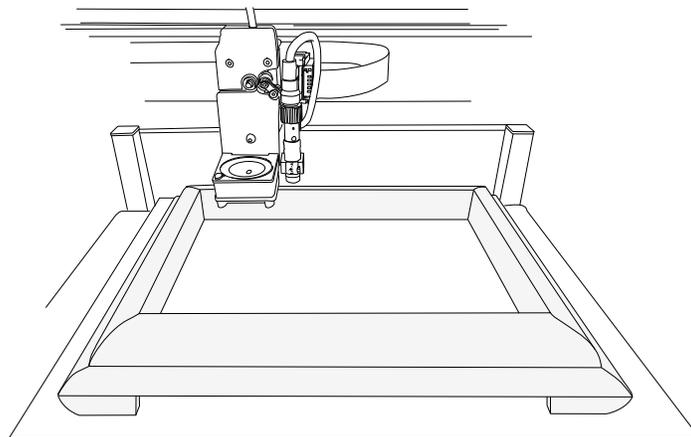
3-D printed traditional mould and deckle



3D printed ribbed mould with a modified deckle, slide-out Mylar barrier and removable laid or wove screen

Using a 3-D printer we printed a 14.5 cm x 21.5 cm (5.75" x 8.5") standard ribbed mould and a modified deckle. We increased the height of the inner wall of the deckle to create a confined area, enabling us to pour and trap a measured quantity of furnish for each sheet of paper. Additionally, a slot was created on the long side of the deckle's bottom edge.

Our modified mould, deckle and laid screen were printed on a Type A (PLA) printer. Our design is based on a 3-D model design generously provided to us by hand papermaking inventor Brian Queen. Brian modeled his mould using Geomagic. Magnolia Master Printer Nicholas Price imported Brian's .Stl file into Fusion 360 and made the necessary modifications.



Printing a "tall" (1 liter) deckle with a slot for mylar barrier

Determinate papermaking with a traditional ribbed mould and deckle (continued)

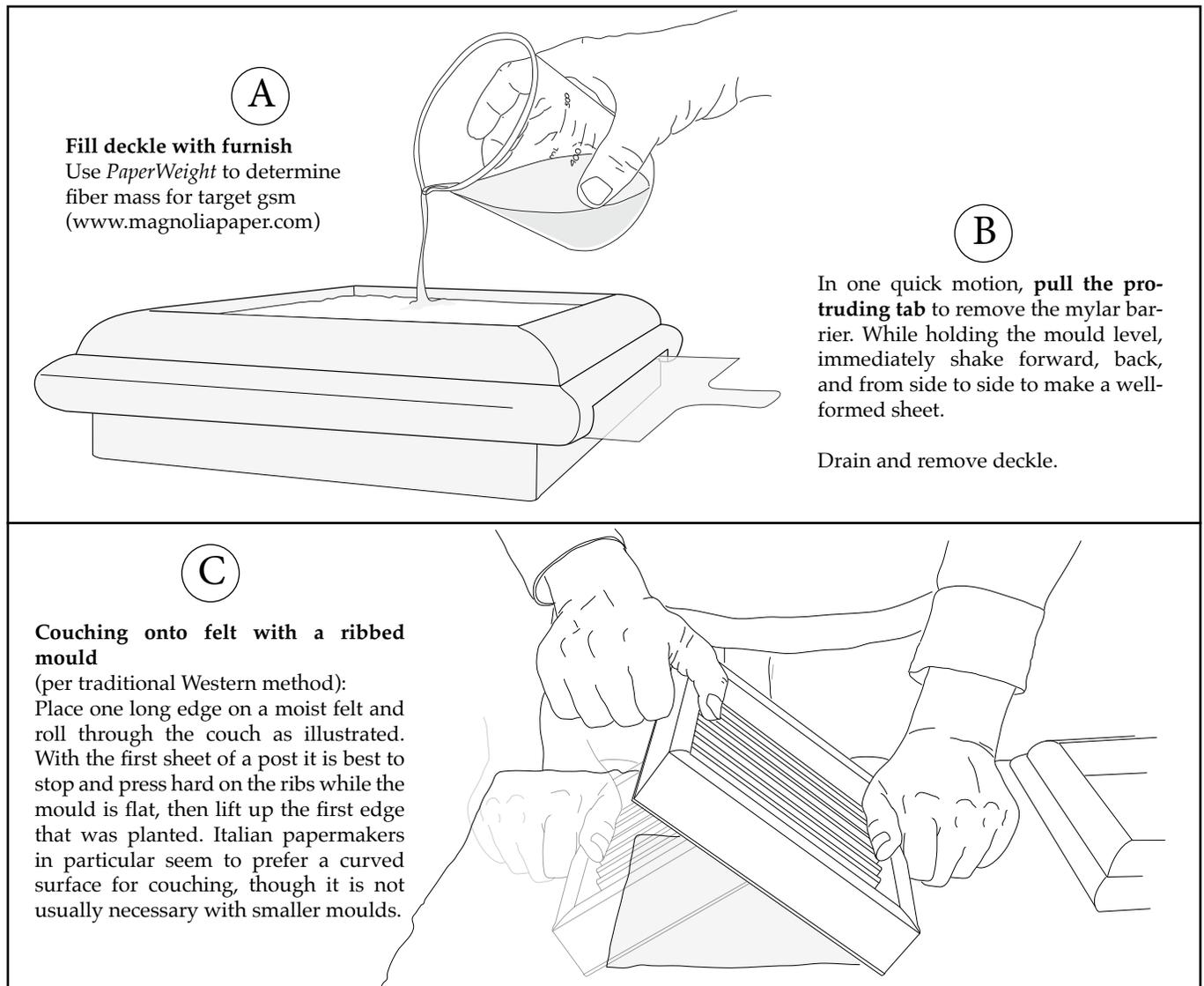
A rectangle of mylar is cut to fit the inner frame of the deckle and sports a tab protruding from the long side. The mylar is placed on the mould and covered by the deckle; the tab protrudes from under the deckle, through the slot, towards the far side of the mould.

With the mylar blocking the drainage of the mould, furnish (with formation aid (tororo-aoi) to slow drainage)* is poured into the deckle, filling the deckle area. Then, like the magic trick where a table setting remains in place when a tablecloth is pulled from the table, the mylar is quickly pulled (via the tab) from the mould, allowing the furnish to drain and the maker to form a sheet.

After draining, the deckle is removed and the paper is couching onto a felt, then pressed and dried as described above.

***Formation aid** slows drainage, allowing more time to make a well-formed sheet. After blending half-stuff for 2 to 3 minutes, add 25 ml of formation aid and blend for another 1 second; with more blending, foam becomes a problem. Stirring, shaking or pouring from beaker to beaker helps agitate the furnish just prior to filling the deckle. It is easy to notice when too much formation aid is used: drainage seems to take forever.

Note: When using PNP (granular) formation aid, mix the solution at least one day in advance. Formation aid has a long shelf life in liquid and granular form.



Series links:

- No. I: [Introduction: fibers, hydration, fibrillation & freeness and suppliers](#)
- No. II: [Retting: lignin removal using mycelium](#)
- No. III: [Calculating paper weight with a smartphone app](#)
- No. IV: [Finding the surface area of an irregular sheet](#)
- No. V: [Blender processing paper fiber](#)
- No. VI: [Formulating pulp for color and content](#)
- No. VII: [Making small paper with 3D printed deckle box and an AeroPress](#)
- No. VIII: [Techniques for forming laid and wove paper without a vat](#)
- No. IX: (Next:) [Drying handmade paper](#)
- No. X: [Sizing and burnishing](#)

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