

## PARCHMENT OVER BOARDS

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This workshop will explore the binding of books in parchment over boards. Because of its reputation, people tend to shy away from parchment as a binding material; it is the focus of this workshop to dispel some of that anxiety. We will explore techniques, which will enable you to work successfully with parchment. You may not be able to completely control parchment, but you can learn to work with it to achieve excellent results.

For the purposes of simplicity, I will use the term parchment throughout. Vellum and parchment are often used interchangeably and structurally they are the same. Vellum, however, is the skin of a young (six months or less), unborn or stillborn calf, which has been unhaired, then dried under tension. All other skins unhaired and dried under tension; sheep, goat, deer, etc. are referred to as parchment. With its more supple nature and thin, consistent surface, vellum is more often used as a substrate for writing, while parchment is more often used for binding. Practically speaking there is no difference.

Parchment differs from leather in its manufacture, its response to the environment and how it is worked. To get a better understanding of working parchment it is helpful to know how it is made and to see how it differs from leather. Working parchment merely requires techniques you already use with leather and cloth binding. The main difference is that parchment is stiffer and needs to be worked as dry as possible.

Because of its hygroscopic nature, the surface area of parchment expands and contracts greatly. It can change by as much 10 % when the humidity of the environment changes. If a piece of parchment is a 10 cm square it can grow or shrink as much as 1 cm. This is what gives one pause when beginning a parchment binding. We are going to explore two types of board construction that will give you an advantage when working with parchment. The techniques explained here will give you a book with boards that are flat. Parchment, however, is very susceptible to warping when poorly stored. Extreme humidity will permanently alter the physical structure of the skin and therefore may cause the boards to warp. Extreme dryness will desiccate the skin also causing warpage, but proper re-humidification may bring the boards back into equilibrium. A temperature above 140°F (60°C) will also damage parchment irrevocably.

### HISTOLOGY

For thousands of years animal skins have been treated in some manner to limit or halt putrefaction. Skins have been used for many purposes, among them: clothing, shelter, storage vessels and as a surface for writing. Without a means to halt the natural breakdown from bacterial action, the skins would soon decay. Parchment and leather are created in differing methods but both are a chemically and physically stable material.

Even though they both begin the process as a flayed unhaired skin, parchment and leather are quite different materials. They are produced by divergent methods and the techniques

for using them vary as a result of their differing natures. To understand parchment or leather, and therefore work either with more confidence, knowing how these treatments alter the skin is important. We will start by looking at the structure of the skin itself.

There are three main layers within a skin: the epidermis, dermis and the hypodermis. The **epidermis** is the outer layer. It is composed of **keratinous** (or lining) tissue. During processing, this layer is removed along with the hair.

Below the epidermis is the **dermis**. The dermis itself is divided into two layers. The uppermost is the **papillary**, the layer from which hair grows and the layer that becomes the grain we associate with the processed skin. The epidermis dips down to the dermis at the point where hair follicles form. The hair grows from its base in the papillary layer of the dermis up through the epidermis. The hair is in fact, made of the same keratinous materials as the epidermis. The **reticular** fiber network of the dermis contains the blood vessels which feed the hair, the **erector-pili** muscles which cause the "hair on the back of your neck" to stand up as well as sweat and **sebaceous** (oil) glands.

The dermis also contains **ground substance**. It is a sticky, viscous material, made of mucopolysaccharides (long chains of sugars) and proteins, which aids in lubrication of the dermal fibers and healing of the skin. For our purposes the most important aspect of the dermis are the ramified bundles of **collagen** (which means "glue forming") fibers. Ramified, means that the fibers branch as a tree. These bundles of fibers are tightly wrapped with stretchy fibers of the protein **elastin**. It is this layer, which gives the leather or parchment strength.

The third major layer is the **hypodermis**. That is the layer where the muscle and fat are found. During processing this layer is completely removed. In essence the processed skin is solely the reticulated layer and papillary layer or grain of the dermal layer.

## MANUFACTURE OF SKINS

The processing for either leather or parchment, as it is now practiced, follows a standard model. The chemicals may vary in order to give the skins differing characteristics, but the process is basically the same. Flayed skins are soaked in cold water to remove dirt and hydrate the skins.

Next the skins are unhairing. This process is more important than the name would imply. Usually the skins are placed into a bath of lime containing sodium sulphide (a water soluble salt with a high pH), which is used as a sharpener reducing the time necessary for unhairing. The sodium sulphide reacts with keratin proteins, which make up the hair and epidermis. This aids the lime in loosening and dissolving the keratin, thus allowing the hair to be easily removed. During this process, the collagen fibers swell up when they come in contact with the alkaline solution. This swelling will aid the infusion of other solutions later in the process.

Following the unhairing, the skins are scraped to remove the remaining hair and epidermal tissue. This may be done by hand, draped over a wooden beam and scraped with a blunt

double-handled knife, or run through a machine, which performs the same task using rollers and helical blades.

Again, using the wooden beam and a sharp, double-handled knife, any hypodermal tissue and muscle not removed in the flaying is shaved from the flesh side of the skin. As in many tanning operations nowadays, **fleshing** too can be accomplished with machines.

If leather is the material to be produced, the skins are taken from fleshing to **deliming**. The skins are placed into a weak acidic solution to reduce the pH.

After deliming, the skins require **bating**. Bating was historically accomplished using dung from dogs or fowl. Enzymes in the dung acted by digesting parts of the skin. Over the years dung has been replaced with processed enzymes. Through bating many things are accomplished. Among them are removing dirt and grease as well as the ground substance from the skin. It also reduces the plump and swollen nature of the un-haired skins. This gives them flexibility and drape. The use of specific enzymes, pH and temperature as well as the length of time the skins are bated determine the nature of the final product. Bating also dissolves and removes most of the remaining ground substance and weakens the elastin, which binds the collagen fibers so tightly. This “relaxes” the skin making it more pliable. Imagine a bundle of flexible rods tightly wound with string, then the string is cut. Once the string (elastin) is cut and the ground substance is removed and the fibers are free to move. Parchment as well as leather is bated but in the case of parchment it is mainly to remove the dirt and grease. Much of the ground substance remains and the elastin is not broken down.

Up to this point in the process, one could be working a skin to produce either leather or parchment. If parchment is what’s required, the skin is then dried under tension on a horse or stretching frame. The damp skin is stretched by means of strings and clips or with strings wound around small pebbles embedded about the edges of the skin. The skin is allowed to dry under strong tension. After drying, the skin is scraped to thin it while still taut. We will come back to a further comparison of leather and parchment after proceeding with the operations, which result in leather.

The final treatment for leather is the tanning. This involves an infusion of tannins, derived from plant material or certain metal salts (chromium, aluminum and zirconium), which bond to the proteins transforming the skin into a material, which resists putrefaction and does not readily absorb water. The result of tanning is a skin where the fibers have some loft, suppleness and stretch.

Parchment is completely different. Several things have happened in the skin to bring about these differences. Even though it is bated, the ground substance is not completely removed. In addition to that the elastin fibers are still tightly wrapped around the collagen. The string has not been cut and movement of the “flexible rods” is restricted. Being dried under tension has created the most important changes. The fibers have chemically bonded with each other further limiting their movement. The stretching has also caused the fibers to lie over at a low angle, aligned nearly parallel to the surface of the skin. This is quite unlike the more vertical nature of the fibers in leather.

The result of these changes within the skin is the characteristic rattle of parchment, its opacity, great tensile strength and ability to withstand tearing. The strength and tear resistance are what make it such a wonderful material for binding. Keep these aspects in mind when working with parchment. Disruption of the structure changes the nature of the skin. Unlike leather, parchment can revert back to a raw state and therefore, is also more susceptible to biological attack.

When working with parchment it is best to avoid using much water, as it can disrupt the structure. If you wish to gently soften parchment, the use of a 50/50 mixture of either water and isopropyl alcohol or water and ethanol will achieve this with less disruption to the structure.

### PARCHMENT BINDING

The first thing we want to do is to cut out a piece of parchment slightly oversized for covering the book. For an average size book a thickness of .010 - .015 is good. Thicker parchment is more difficult to work and the material is so strong that an overly thick piece is not necessary. The cover joint will not flex as well with thicker parchment either. For limp parchment bindings though, a thicker skin gives the book some structural stability. If one has a choice, when cutting the skin, take it so that the joints of the book are aligned with the spine of the animal. The final size of the parchment should be cut large enough to wrap around the book with about 2.5 centimeters, all around, for a turn-in. For this initial cutting, add about a centimeter more in each direction in case the laminated parchment shrinks.

The flesh (under) side of the parchment then needs to be lined with paper. The paper lining fulfills several distinct needs. It reduces the translucent nature of the parchment (assuming you are not utilizing that aspect of parchment for design), stabilizes the material and allows you to use most any type of adhesive you wish when putting the parchment onto the book. Choose a light to medium weight paper with very little intrinsic characteristics; laid lines, watermarks or other features. These may “telegraph” through the parchment. The grain direction of the paper should, as usual, be running head to tail on the finished binding.

You can use several different types of adhesives for the purpose of laminating the paper to the parchment; gelatin, rabbit skin, hide glue or parchment glue. Each of these glues are animal based and contain collagen, a protein found in the dermal fibers of skin, that makes them more suitable when adhering parchment. Some people add glycerin to the glue, but it makes parchment even more hygroscopic than it already is, softens it too much and gives a foothold to future mold growth, so it is not recommended. If crystals are used they should be well stirred into cold water, placed in the refrigerator and allowed to stand overnight in order to swell before heating. Powdered glue, stirred well into cold water, may be ready to heat within thirty minutes. A double boiler or electric glue pot is a suitable container for heating the glue. Another good, practical way to heat small batches is a cup warmer. Do not allow the glue to boil, 104°F is an ideal temperature. At 178°F the glue will be ruined.

Paste will work nearly as well as warm glue, in that it is a good adhesive and bonds well. Paste does have an excessive amount of moisture for parchment, but should not harm the skin appreciably if the laminate is dried under tension. Bare in mind too much pressure for too long could cause transparent areas to appear in the parchment. PVA doesn't have the chemistry to be as compatible as hide glues, but will also work. The various starch and collagen based adhesives work better. Whichever one is chosen, glue off both the paper and the parchment, keeping moisture to a minimum. Allow them to relax, glue them both again. Place the parchment and paper together and with Holytex (or other suitable non-stick open weave material) and blotters on either side and give a quick nip. Upon removing from the press, change blotters and place between boards and a heavy weight. Change the blotters often for the first several hours, then daily until the laminate is completely dry. Several days are best to ensure the parchment dries fairly flat.

## BOARDS

Now we turn our attention to the boards. There are several ways to construct boards for parchment bindings. There is "cross-grain laminate" and a "floating board" construction. The **cross-grained** board is usually made with at least five, and sometimes more, layers of very thin board or card stock. Because of its stiffness the board can withstand the pull of parchment better than standard binders' board. A properly made cross-grained board is harder for parchment to warp. Regardless of how many layers are used, there has to be an odd number. The layers should be made with stiff thin board around .010 - .015 thick. To make a board with five pieces, cut three of them with the grain going head to tail and two of them with the grain running from spine to foreedge. The makeup of the cross-grained boards is a sandwich with a long-grain board in the middle, two short-grain boards on either side of that and two long-grain boards on the outside of that. It is easiest to moisten the inner long-grain board, then glue off the two short-grain boards. Allow them to relax, glue them off again and place them on either side of the one long-grain board. Glue off the remaining two long-grain boards, let them relax, glue them off again and place them on either side of the sandwich.

More than five boards can be used to make a laminate but it is important to have the two outer boards be long-grain and to be sure that each board is glued to one having a different grain direction. It is this cross-graining that gives the board enough rigidity to remain flat when covered with parchment. Cross-grain boards can have a tendency to become saddle-shaped and it is for this reason that I don't recommend them for quarto or larger size books. To make cross-grain laminate boards even more rigid, soak the laminae in water. When thoroughly wet, take them out of the water and press to remove the excess water. Using paste instead of glue, assemble the boards as before. The paste permeates the boards and makes them more rigid. With either method, the boards will need to be dried in a very controlled manner. Press between Holytex and blotters and change the blotters often for the first hour or two, then daily until the boards are completely dry. If allowed to air dry the boards will warp into saddles. With either method of assembly, the finished boards should be lined with plain white paper and paste to add stiffness.

There is another type of board, a **floating board** construction. It takes advantage of the propensity for parchment to continue to change dimensionally through the years. Instead of fighting the parchment, it moves with it. On many parchment bindings, the parchment

will shrink back from the fore edge causing the boards to warp and possibly pull the parchment from around the fore edge, tearing the pastedown. This board is built to help counter that tendency. It consists of a thick board and a thin board. The thick or “base board” board may be a laminate, like the previous boards, or single-ply. On a quarto or less, single-ply is fine. For larger books, a laminate might be better. Depending upon how thick a board is needed, the base board laminate might be only three layers thick. If that is the case, don’t cross-grain the laminate. Less than five pieces can make a cross-grained board more likely to become saddle-shaped. On large books you may want to make the floating board a laminate of two layers, both pieces should have the grain running head to tail. Once you have the two components, they should both be lined with paste and plain white paper. Leave them standing, leaning against each other for ½ hour to an hour to air dry a bit and then press until completely dry. When the boards are dry, trim one edge (spine) of both pieces. Mask off a 2 mm wide strip along the spine edge of the base board and glue it off with 60 % polyvinyl acetate and 40% methyl cellulose (pva/mc), place the floating board on it; carefully line them up flush to the spine edge and then a quick nip. The boards may be removed from the press and set aside, under weight, to dry. Later the boards may be trimmed down to the correct height and width.

### TEXT BLOCK

Sewing a book for parchment binding need not be any different than for other books. They can be sewn on flat tapes, flattened cords, sunken cords and for the adventurous, raised cords. We will look at sewing on parchment tapes. The tapes will be laced through the cover, which makes a stronger connection to the textblock and gives an added visual element to the finished binding. Using a straightedge and knife or the drop gauge of a board cutter cut enough tapes for each of the sewing stations intended, the two endbands and one extra. Use a slightly thicker skin if available .015 - .020 and cut them running in the same direction as the spine of the animal, not too near the skirt. It is fine to cut them along side the spine but the strips not only need to be strong but very flexible as well. If the spine of the animal is too horny the tapes may be hard and inflexible so stay 2 – 3 cm away from the spine. Avoid any imperfections in the skin; these tapes need to be as strong as possible. Their width should be 2-3 mm and the length equal to the thickness of the book plus about 10-15 cm. Once you have cut the strips give them each a moderate tug to test their strength. If they break easily, cut more from a different part of the skin. If you pull on them very hard you can break them though so use judgment.

The endsections for the book can be any of the various types commonly used. A good way to add some color to the book is with a German-style endsection. Take a single folio of white (text) paper and a single folio of a colored stock about 5 mm wider than the white folio. Mask off 2 mm along the spine edge of the white folio with a waste strip and apply pva/mc. Overlap the spine edge of colored folio onto the spine edge of white 2 mm in, bone down and nip between Holytex and blotter. Remove from the press and with a straightedge and bone folder score the colored folio right up against the fold of white folio. Slide the folder underneath the colored stock, turn both leaves over onto the white folio and bone down. Place both endsections on the book with the colored stock facing out.

A guard of Japanese paper, about 3 cm wide and the length of the signatures, should be adhered to the spine edge of the first and last signatures. This will ease some of the stress at

the opening of the book and cover over the small tab of colored stock showing on the inner side of the endsection. Using a waste strip mask off all but about 2 mm of the spine edge of the first signature on its last page and brush it with paste [paste should always be used on the text pages]. Remove the waste strip and place the Japanese guard onto the signature covering the 2 mm strip of paste. The rest of the guard hangs over the edge of the spine fold of the signature. Rub down through a piece of Holytex and set aside. Do the same with the first page of the last signature. When dry wrap the guards around so they face the beginning of the first signature and the end of the last signature.

Cut a strip of card stock the length of the textblock from head to tail and about 3 cm wide for use as a sewing jig. Each sewing station will be a pair of holes, the distance apart consisting of the width of the tape plus 2 mm. For example, on 2 mm wide tapes the pairs of holes should be 4 mm apart. Add the number of sewing stations together and multiply that by the distance between the pair of holes that constitutes a sewing station. For example, 4 sewing stations times 4 mm is 16 mm. Mark off that amount on one end of the card strip and divide the remainder of the card strip into five segments with a pair of dividers, the fifth and last segment being about 8 – 10 mm longer than the other four. That last amount, along with the number and size of sewing stations, will vary depending upon the size of the book and the aesthetics you choose for the spine.

To do this, take the dividers and lightly walk off the distance one leg at a time. Widen or narrow the distance between the legs as needed until the fifth mark ends short of the end of the strip by the required (8 – 10 mm) amount. When you are satisfied, place the leg against one end of the strip and push the other leg into it leaving a clear prick mark. Measure 4 mm along from that mark, put a leg of the dividers there. Walk the dividers along and push the other leg into the strip again. Once more mark 4 mm from that leg and continue marking off the four sewing stations. You should end about 8 – 10 mm from the end of the strip. This gives you a strip with the sewing stations evenly marked and optically centered (the last segment, the tail, being larger than the others). Now measure in from both ends of the strip and make marks 1 cm in for the kettlestitches.

Place the strip inside the center of each signature, align it to the top and using a needle awl poke small holes in the signatures. By keeping the holes small the sewing needle will enlarge them only as much as it needs to. Large holes cause more damage to the pages than necessary. They may also cause the sewing loosen and will let glue inside the signatures. For the endsections the holes should be made right at the edge of the fold, not in it. That way the thread won't show in the joint after the book is cased in. To do this lay the end section down with the side to be pasted to the cover board facing up. Open it to the inside holding the outer pages at 90° to bench. Push the awl straight down along the face of the upright pages. This will make the holes just off center. Keep this strip for future use.

Cut a scrap piece of binders' board a bit larger than the book. Take one signature and place it's spine against the long edge of the board, head to the left. Place a light weight on both the board and the signature. Lay one of the parchment tapes on the board at the sewing station indicated by the signature. Less than half of the tape should be placed on the board with the grain side of the parchment facing up. Using a low-tack tape fasten the sewing tape to the board. Do this to all the tapes except those for the endband. Turn the board over; tapes towards you and you have a makeshift sewing frame. Place the stack of

signatures and endsections on the bench with the spine away from you and the head to the right and commence sewing in the normal manner. We will be backing the book to approximately a 45° angle so you should choose thread, which will give you the most strength and a moderate amount of swell.

After sewing, the guards need to be put up. Open the book between the endsection and text, slide a piece of 10 mil Mylar under the guard as a cutting surface. With a straightedge and knife cut the guard down to 3 – 4 mm (enough to cover over the thin strip of colored endsheet showing and go up onto the white endsheet). Replace the Mylar with a strip of waste paper and glue off the short guard with pva/mc. Remove the waste paper and put the endsection back down onto the textblock. Because the holes in the endsection were punched slightly off center the endsection will want to pull back toward the spine of the book. Carefully line up its spine edge and head to the spine edge and head of the book; give a light press with the hands. Open it back up a bit and slip a piece of Holytex between the endsection and textblock and put a weight on the spine of the book to dry. Check to see that the sewing supports are not caught by the glue.

When the guard is dry jog the book up to the head and spine and place it in a lying press with the spine facing up. The tapes should be fairly easy to slide back and forth. Even them out front to back and using the tip of a bone folder, close up the sewing holes. If the tapes have gotten damaged during sewing or you have any reason to doubt their strength this is the last chance to address that. You can weave a new tape underneath the sewing thread by cutting the end of the new one to a point, poking a hole in the point and slipping a piece of thread through the hole. Double the thread over and with a needle run it under the sewing thread where the damaged tape was removed. With the thread you can pull the new tape under, remember the grain side should be up. With the spine firmly locked in the press brush paste well into the spine and between the signatures. Brush away any excess paste and remove the book from the press. Set the book on the bench with the spine over the edge and place with a weight on it to dry.

If the book is to be trimmed this is the time to do it. Next is the rounding of the spine. Using a slightly damp sponge, moisten the spine of the book and let it set for a minute so the paste and textblock may relax. Moisten it again and lay the book on the bench with its spine away from you. Place one hand (the same hand you will later use to hold the hammer) on the spine with moderate pressure and take the foredge in the other hand. With that hand fan the foredge up and hold the pages firmly in the fanned position. Lessen the pressure on the spine a bit and roll the fan toward you as you keep the spine flat against the bench. As the top side of the textblock slides forward the fan will start to flatten out and you will see that the spine and foredge are slanting up toward you. Hold the foredge down firmly on the bench, release the spine and with a backing hammer or the heel of your hand strike the spine edge along the endsection with a glancing blow using only moderate force. Do this from one end of the spine to the other. Flip the book over, hold the spine edge down, fan the foredge as before and start the process over. Always work in a consistent manner going from one end to the other and working each side the same number of times. Usually it will only take two or three times on each side to work the textblock into a rounded shape.

If you find that the front or back is not rounded as well as the rest of the book, place that side face down on the bench. Fan the foredge as before but drop about one third to one half

of it before gripping and rolling the fan towards you. Concentrate the blows along the spine where the slant stops and the flatter area begins. This will send the force into that less rounded part of the spine. You may need to do this again, dropping more of the fan each time until the round is correct.

When satisfied place the book into a backer or lying press and push it down until the shoulders of the joint come to a natural stop, where the slope of the shoulder flattens out. You may accentuate the shape of the shoulder with a hammer, your thumbs or a Teflon folder. If using a hammer apply only glancing blows. Starting just off the center of the spine work the backs of the signatures over towards the joint in a consistent manner from head to tail. Proceed again with the same motions but starting further down on the shoulder. Keep doing this, coming closer to the edge of the shoulder until you have the desired angle. Be careful if you are using a hammer. As the hammer comes closer to the shoulder edge the same force you were using before will be enough to break the paper or the tapes, if you hit them, between the hammer and the backer. A 90° shoulder does not benefit the book in any way so going that far isn't necessary.

It is at this time that you should make the boards because only now can you judge the thickness you need based upon the height of the shoulder. A variation of sewing thread can make any textblock thicker or thinner at the spine. The point is to use a thickness of thread that gives you the most strength and couple that with a board whose proportions compliment the thickness and size of the book and gives the required protection. A thin book will want a thin board and usually that will mean a thinner thread so the spine doesn't swell too much. Since a thinner book doesn't have as much sewing as a thicker one, a heavier thread may work fine. Obviously you don't want a thread, which is too thin for the strength that is necessary or so thick that the spine has a lot of swell. As with other aspects of binding you must use judgment.

With the book in the press measure the width of the rounded and backed spine with a strip of paper and pencil. Keep this reference for further use. Cut a piece of medium weight Japanese paper to the width and length of the spine. Mist the paper and paste off the spine of the book. Lay the paper on and pat down with hands then rub with a Teflon folder. Apply a bit more paste to the top side of the paper and rub that in well until the paper is saturated. Remove the book from the press, place it on the bench with the spine over the edge and weight it.

This is the time to sew the endbands. Take two of the extra strips of parchment you cut earlier. Fold the strip of paper showing the spine width so that the two pencil marks meet each other, take the pencil and slide it along the resulting fold giving you the center between those two marks. Measure to the middle of the two parchment strips and mark the center with a pencil. Place the center mark of the paper strip on the center mark of the parchment strip and note the spine width on it with a pencil. Cut a piece from the third parchment strip about 1 - 2 mm less than the width of the spine and glue it, flesh side to flesh side, in the center of the larger strip so that it is double thick. This will give more thickness to the area of the strip on which the endband is sewn. It is a bit narrower than the spine because the endbands are never the full width of the spine. Center the strip and sew the endbands. It is not the aim of this paper to go into sewing endbands. Most how-to books on bookbinding have sections devoted to this. Consult one of those books for instruction. If you wish you can make a "stuck on" endband by wrapping the core with

paper, silk or other sheet material instead of sewing one. To do this cut the material to the width determined by the by the extra piece of glued on parchment. Cut its length to 2 – 3 cm. Glue it off and lay the core 2/3 of the way up the length of the material. Fold the upper 1/3 over the core down onto the lower 1/3. Work it tightly round the core and put aside to dry. When nearly dry, glue it onto the spine as you would any stuck on endband.

Once the endbands are sewn a piece of muslin or linen is cut the height of the spine plus one endband and the width of the spine plus 6 – 7 cm. When applying the cloth to the spine it will be centered top to bottom so that each end will come about halfway up the endbands as support. You may cut the cloth on the bias for the most strength or cut it across the warp, as it is usually stronger than the weft. Sizing the cloth with paste, methylcellulose or gelatin will make it easier to handle as cloth cut on the bias is very floppy. Fold the cloth in half lengthways and mark the center at head and tail. Using the center point of the cloth find the width of the spine on it using your paper strip. Then draw two parallel lines down its length describing the spine width. Take the sewing jig and center it head to tail against one of the lines and mark the width of the tapes, not including the spacing for the sewing holes. Do the same against the other line and with a pencil join each pair of marks across the width of the piece of fabric. Working across the width of the spine part of the fabric, cut out the boxes that define the parchment tapes as they cross the spine. Place the book into a lying press with the spine up and glue the spine with pva/mc. Lay the fabric on the spine threading the tapes into and out of their respective boxes so they are on the outside of the cloth and bone down. Put a small amount of pva/mc on the outer side of the fabric and bone down well.

Once the book is up to this point, a hollow tube needs to be made. Using a scrap of handmade paper cut a piece a bit taller than the spine and three and a half to four times the width. Moisten the paper; place the book in a lying press and glue off the spine with pva/mc. Center the paper on the spine and bone it down. Let it dry for a minute then with the bone folder break one side of the paper over along the edge of the spine and bone the fold sharply. Where it goes over the other edge of the spine crease it down and note that crease by making a small hole with an awl at either end of the flap. Remove the book from the press and lay it on the bench. Place a cutting mat on the book and bring the flap with the holes over onto the cutting mat. Cut it slightly narrower than the marks indicate. Place the book back into the press, glue off the outer surface of the trimmed flap, lay it across the spine and bring the other flap over onto it. Rub down and let it dry. When dry fold back the extra amount of the top flap with a bone folder as before, place a knife under the crease and slice off the excess. Cut the cover boards to the correct height. Hold the boards in place, reflecting the proper square and using scissors trim the height of the hollow to match the height of the boards.

### BOARD ATTACHMENT

After the hollow is finished you will need another piece of medium weight paper, the length of the hollow and around 5 – 6 cm wider than the spine. The hollow is glued off and this paper is placed over it, flush with the head and tail and the excess width evenly lain over either side of the spine. Place the textblock in a lying press, rub down and mold the paper to the spine. This procedure will leave two "wings" on either side of the spine.

Next we want to attach the boards to the textblock. For a book with boards of average thickness, a French groove of 3 mm will work fine. To achieve this, lay an eighth inch wooden dowel or brass or acrylic rod on top of the paper wing, up against the shoulder of the book. Place the board against the dowel and check the foredge square. Cut the boards to the correct width and with a sharp knife; take a small vertical nick out of the foredge at top and bottom of the boards. It should be about 2 – 3 mm long and as deep into the board as the thickness of the lined parchment cover. This will allow for the extra parchment on the board corners when the cover is made.

Using pva/mc, glue off a 1 cm wide strip of the base board along the spine edge running head to tail. Place the board onto the paper wing, up against the dowel. Check for an even square at the head and tail and nip. Remove the book from the press and turn it over. Attach the other board in the same manner. Use a right angle to make sure the two boards are even with each other and nip. When the attachment is dry, open the boards and remove the excess wing paper by tearing it at an acute angle. This will leave a graduated surface where the paper is glued to the board. If the result is rough you may lightly sand it.

## COVERING

Now we turn our attention to covering the book. Make a pattern for cutting the parchment by wrapping a strip of paper around the textblock and boards. Work it down into the grooves and allow for a turn-in of 1.5 - 2 cm at both foreedges. Cut a piece of paper, oversized and transfer these marks to it for the pattern width. Place the book on top of the paper pattern and note the height of the book plus 2 cm top and bottom for turn-ins. Cut the pattern to its final size. Lay the pattern on top of your previously prepared parchment and cut. Measure and mark out the width of the spine onto the grain (upper) side of the parchment using only a pencil. Pencil marks can be easily removed later with a vinyl eraser. Marks of any kind, on the paper lining, may show through the parchment when the binding is finished. Marks on the boards or spine may also show, so be aware. Mark out the head and tail turn-ins in the spine area. This will be your guide for thinning the parchment turn-ins at the spine. To thin the parchment, you can use a high-speed sanding drum (such as a Dremel or Foredom flexible shaft), sandpaper or a paring knife. If using a paring knife, lightly sponge the parchment in the area you wish to pare with a 50/50 solution of isopropyl/water. This will soften the parchment enough to allow you to pare it similar to leather. It won't pare quite as easily as leather but fairly well. It is best to keep the moisture to a minimum.

When the endband areas of the parchment have been pared, measure the distance around the spine of the book, including the French groove to the board edges. Lightly transfer these marks to the lined side of the parchment, at the outer edge of the turn-ins so they can't be seen in the finished binding. Along the outer edge of these marks place two pieces of low-tack painters' tape the length of the spine, connecting these marks from head to tail. This will define the spine area between the boards. This area will be glued with pva/mc. Before gluing the parchment, take a sharp knife and slit the hollow and wings at either end of the textblock for about two and a half centimeters along the fold of each joint so the turn-ins may be slipped inside later. After you do this you will find a small bit of paper from the hollow, stuck to the backside of the endband. Take a pair of scissors and trim it

back level with the top of the endband, being careful not to trim the outer side of the hollow or cut the endband.

Using a cotton ball and 50/50 isopropyl/water, moisten the outer side of the parchment in the area to be glued. This will soften the surface of the parchment so the glued area can be more easily worked. Apply the glue and wait for a few moments to allow the lined side of the parchment to soften. Glue it off again, remove the tape and wrap the parchment around the spine of the text block, taking care to keep it even head to tail and front to back. Work the parchment into the French grooves using a Teflon folder then set dowels into the grooves. Slip pieces of 10 mil Mylar into the book between the tapes and textblock to protect the textblock against impressions from the tapes and cloth reinforcement and place the book into a press. [You can easily make pressboards by taping the dowels to the upper edge of a piece of binders' board or a wooden board. Be sure that the tape is far enough towards either end that it won't be in contact with the book.]

When the book is dry, remove it from the press. Mark the corners of the boards on the lined side of the parchment. Using scissors cut the corners of the parchment off at a 45° angle, leaving about one and a half to two board thicknesses from the board corner. Either sand the parchment corners, so they will lie flush when folded over, or mist them with 50/50 isopropyl/water and pare.

Another way to work the corners is to cut them with a tab instead of just an angled cut. Draw an angled line on the cover as you would normally but about 2 - 3 times the board thickness away from the corner. With a sharp knife trace a line from the head or tail edge of the board where it meets the parchment straight to the foredge of the parchment. Measure the thickness of the board and draw a line parallel to the cut line that much further out from the board but don't cut this one. Cut the corner off along the angled line stopping where it crosses this drawn line and starting again at the cut line on the other side of the defined tab. The line that was first cut and that part of the angle will fall off. Cut the other line from its meeting point with the angle, straight out to the foredge and that piece too will fall off. You are then left with an angled cut and a tab sticking out from it. Cut the length of this tab to fit into the nick made earlier on the foredge of the boards. Pare this down as you would a regular corner.

Glue off the boards, with pva/mc, lay the parchment down, place Mylar inside again as before and press. Care should be taken when pressing the damp parchment, as too great a pressure for too long of a time may cause it to become transparent. Once the boards are dry enough (about 10 minutes), remove the book from the press. Using the 50/50 isopropyl/water and a cotton ball, dampen the outer side of the top and bottom turn-ins. Glue them off with pva/mc and let them relax. When you glue them off for the second time, apply some paste in the endcap area of the turn-ins to extend the drying time so you can more easily mold the endcaps. Turn the edges in, sliding the endcap inside the slit hollow. It is the turning in of the edges that trap and hold the floating board to the base board and complete the structure. If the turn-ins are fighting with you tape them down to the inside of the boards with low-tack painters' tape. Keep the tape away from any part of the parchment that will show after the pastedowns are done; it may leave marks. Work the turn-ins well with a Teflon folder while they are still damp. You will find that the parchment molds easily.

While the top and bottom turn-ins are still damp the endcaps must be worked. Pull out enough parchment so that when it is folded over, the endbands will just be covered. With a leather binding you pull out the needed amount of endcap leather, stretch a string across the endcap and mold the leather into the backcorners to take up the excess. Then you pull out the “ears” of the endcap with a pointed folder and tamp it down flat. With a French groove there are no backcorners and the excess parchment has to go somewhere. If you merely tamp down the endcap the excess will cause the endcap to become wrinkled. You have to get rid of the excess and the way to do that is to tuck it down beside the endband. Take a fine pointed folder and poke some of the excess parchment down between the French groove and the endcap in a “V” shape. As you do this you will see the parchment tighten across the width of the endcap. Work the other side in the same manner. When you are satisfied that you have tucked away the excess, tamp the endcap down with the flat of the folder.

Moisten and glue off the foreedges, turn them in (tab first if using this method) and form the corner, as you would for a traditional cloth cover. While still damp use the flat of your folder to neaten the corners. Place some cardstock or blotter between the covers and the textblock for twenty minutes under light pressure before removing the masking tape. Remove the painters’ tape and place fresh card stock between the boards and the textblock. Press the book under moderate weight overnight.

If the book was sewn on parchment tapes the next step is to lace them through the cover. Free the supports from any glue that might hinder them and cut their ends to short stubby points. Long thin points will just bend as you use them. A chisel will work better for this than a knife, as the knife wants to cut beyond the short cut. The chisel should be 2 mm wide, if you are making a larger opening then move it over and cut again. [Using a grinder, you can make one from pieces of scrap metal, hacksaw blades, packing crate banding, old butter knife, small screwdriver, etc. The chisel is a useful tool so the effort won’t be a waste, but if you decide to use a knife just be careful that your cut is small.]

Lay the book on a cutting mat and open it up leaving only the board on the mat. Hold a sewing tape down against the cover and perpendicular to the spine. Using a fine pointed awl make prick marks on either side of the tape in the crease where the parchment comes over the shoulder, about 1 mm in from the hollow. Move the tape out of the way and with the chisel join the two marks. Do that for all of the sewing supports except the endbands. You can use the sewing jig to make certain that the slits are evenly spaced. It is best to make all of the slits for the supports before lacing them through, including the endbands, which will be covered shortly. Lace the supports through the slits and pull up any excess. If you pull very hard you may break them. Pull the supports taut across the joint, perpendicular to the spine. Make tiny prick marks to denote the tapes on the other side of the joint just where the parchment connects with lower edge of the board. Make the slits right at the board edge and run the supports through to the inside of the book.

For the endbands the process is the same except they are not run straight across as that would severely weaken the endcap. Run the support at an angle of about 15° away from the endcap. This will give more material between the slit and the edge of the cover so as not to weaken it. On the outside, when making the second slit continue the angle.

The next step is to put up the cloth reinforcement. Trim out the turn-ins to an even and consistent measure. Using dividers set one leg against the outer edge of the board and dial the other leg to the width of the narrowest turn-in. With this as a setting slide the outer leg along the board edges and at either end of each board edge, place the inner leg down and prick the turn-in. Connect the pair of prick marks on each edge using a knife and straightedge and remove the excess turn-in material. With scissors trim back the head and tail of the cloth reinforcement even with the trimmed out turn-ins. Place waste paper under the cloth and glue with pva/mc. If the book is sewn on laced parchment tapes you will see these laying on top of the cloth. The same will be true if the book was sewn on regular tapes or cords. Glue them along with the cloth and keep them perpendicular to the spine. The two tapes from the endbands might not be caught by the cloth, they can however be glued off at the same time. They should be laid up at the same 15° angle they are already running. Remove the waste paper and close the cover onto the textblock. Press with hand pressure, lift the cover as little as possible and slide a piece of 10 mil Mylar between the cloth and the textblock. Turn the book over and do the same to the other side. Put the dowels in the grooves of the cover, place between pressboards and press for about 10 - 15 minutes. Remove the book from the press, take out the Mylar sheets and let the book stand partially open until the cloth is dry. Next trim back the long edge of the cloth square to the turn-ins. To minimize the amount of thickness from the tapes and cloth if you cut through the cloth along side the tapes, peel it off the tapes and clip it away in the gutter area. Seeing the tapes on the inside however, are a clear sign of the book structure and should be considered as part of its beauty.

You will want to fill the area between the turn-ins and the cloth reinforcement. The fill prevents the turn-ins from showing through the pastedowns in the finished book and gives a smooth inner surface to the boards. It may be best to allow the book to acclimatize for a few days before filling in and putting up the endpapers. You can then determine, depending upon how warped the boards are if paste, pva/mc or straight pva should be used for these operations. Paste will pull the boards in more than pva/mc and straight pva will pull the least. If you glue off the trimmed out area of the board, instead of the fill material itself, there will be even less pull because the fill will not have a chance to relax and stretch. If you do this you will still have to glue the outer edges of the fill as you can't easily glue the trimmed out area right up to the turn-ins. Whichever way you decide, rub down the fill well. Place blotter in between the cover boards and textblock and weight the book until the fill is dry.

After the fill is completely dry the endpapers can be put up. Place a piece of waste paper under the pastedown and glue it off. You can use the same considerations in choice of adhesive as you did when putting down the fill. You can also choose to glue off the board and the edges of the pastedown if you need very little pull. Some papers will immediately begin to stretch along the edges giving problems with wrinkles so do this with caution. Remove the waste paper; place some stiff card stock between the boards and the first flyleaf to keep the turn-ins and tapes from telegraphing through and excess moisture away from the textblock. Put the dowels into the grooves, place pressboards on either side and put into the press. After a short time remove the dowels and continue to press. After 20 minutes the book can be removed from the press. Leave it under moderate pressure for a day or two, changing the card stock occasionally, until the book is completely dry.

If there are any rough areas to the finished binding, such as the slits, corners or maybe some whitening of the parchment where it has been stressed, gelatin or rabbitskin glue may help. A small amount can be brushed on and the softened parchment remolded or burnished. Once dry it will not show. A little isopropyl/water or glue may remove the stress markings especially along the board edges.

If you follow these steps you will have a stable book, but as stated previously, parchment will change. To best maintain stable parchment covered boards, keep the book in an environment with a relative humidity of 50% and a temperature of 65° F. The most important storage consideration is to keep the humidity and temperature constant.

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