

A close-up photograph of a traditional bamboo water fountain. A bamboo spout is mounted on a vertical bamboo post, pouring a thin stream of water into a shallow stone basin. The basin contains several smooth, rounded stones. The background is softly blurred, showing more bamboo structures and greenery.

Jo Scheer

How to build with **BAMBOO**

19 projects
you can do
at home

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How
to build with

BAMM



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19 projects you can do at home

Jo Scheer

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*Dedicated to Laura, Sam, & Sophie, who have tolerated
my bamboo predilection.*



INTRODUCTION

Bamboo grows on you. It will grab your consciousness and there will be no turning back. Once awareness has been ignited, bamboo will become part of your life. For those lucky enough to have bamboo a part of their natural world, it is a no-brainer. Bamboo will serve them in many ways—play, in work and in life.

Bamboo is user-friendly, low-tech and easy to work with. Artisans and rural folk in the East have known this for millennia. My experience with bamboo spans twenty years, and bamboo projects have brought me immense satisfaction. With basic tools, a natural material and a synergy of hand and mind, all things are possible—some of which are detailed in the pages that follow. Hopefully, this will be only the beginning, with the techniques and ideas serving as platforms for yet more.

Bamboo, as a raw material or as a prop for life, fits into a much broader philosophy. The incorporation of bamboo into your life fits a lifestyle that reflects an awareness of the natural world, our place within it and a consequent behavior that exemplifies the relationship. We become aware of the necessity to live within the natural constraints of nature—to live in harmony, to live sustainably, and to be reverent.

In the East, bamboo has been revered for centuries for its beauty, utility, resilience and simplicity. Bamboo is all these things, and more. It is a gift to man. Work with it for fun, make something that gives pleasure and you will realize the gift. Its employment for the most pedestrian of uses elevates the use to something more. A fence? Commonplace. A bamboo fence? Art. Utility, though an application of bamboo, is not the real achievement. It is how the bamboo does its job. Bamboo makes the ordinary extraordinary. A bamboo anything is special. Perhaps we recognize the personal human input, to fashion this thing from the raw material. We see how the bamboo yielded to this design, and we see how it is so appropriate and efficient.



GETTING STARTED

Bamboo can be worked into anything—from towering tree houses to toothpicks. It is not much fun to make toothpicks, and a tree house, though a very worthy endeavor, is a large project. Fortunately, most projects with bamboo are of a scale that they can be completed in one day or less. Inspiration can come at any time, although collecting tools and materials may require a more extended time period. Once set up, however, a project can be worked through the day and finished in time for reflection on the day well spent.

First, you will need bamboo. There are a number of retail outlets around the country that are more than willing to sell you bamboo of all shapes and sizes. A quick and easy resource is the American Bamboo Society Web page, www.abs.org. They have a list of retailers, growers and importers, as well as a slew of information. The bimonthly magazine lists the membership every year, and you can find members that live in your vicinity. Communication with these often knowledgeable people may elicit a source for your bamboo project. They often know of local bamboo stands or know of someone else that does. Another source is nurseries or even botanical gardens. And, upon acquiring permission to cull some bamboo, the actual harvesting must be done in a clean and efficient manner. The bamboo will benefit from removal of dead bamboo culms, which are often the best, as they are cured and have a low moisture content. The stand must be left neat and tidy, or you may not have permission to return. The American Bamboo Society is another place to find bamboo aficionados.

Secondly, you will need tools. If you already have a history of woodworking, you will have acquired an inventory of tools easily adaptable to working with bamboo. Some additional tools may be needed and are best to have before you start.

TOOLS

For smooth, fast, precise and loud bamboo shaping, you can't beat a good power tool. The alternative is muscle power, which has its place and is definitely quieter. Hand tools will be best for quick and specific shaping.

Belt Sander: I like the belt sander. It smoothes rough edges quickly. It can be used to fine tune an angle cut or make an otherwise difficult shape. I use cylindrical belt sanders to smooth out holes and adjust them to the eccentricity of a particular piece of bamboo to be inserted.

Brass or Galvanized Wire, 18 to 20 gauge: To prevent splits from continuing through a node, I wrap wire around the culm in two to three loops. Depending on the piece and the use, I use either brass or galvanized wire, 18 to 20 gauge.

Cordless Drill: The cordless drill, with a full complement of hole saw sizes, is something I use often.

Power Compound Mitre Saw: I am enamored with the power compound mitre saw and its 80-tooth 12" blade that easily cuts through bamboo. I like the precise angles possible and the tight fits that can be achieved. With mitred bamboo, an otherwise difficult joint can be done with ease.

Router: I love my router, and use it to round over a bamboo edge.

Saw: I always carry a foldable pruning saw. The precision-ground blade is very effective at cutting bamboo and is easily worked into tight spaces. Smaller tooth size helps but is not essential.

Spoke Shaver: Although it's heavy, I like my spoke shaver. The tool is used to shave off bark from trees and is very effective at splitting large culms and working your way through several nodes. Pour it through and twist—it works great. Alternatively, I have used a machete, but I prefer the spoke shaver.

Swiss Army Knife: First and foremost, and without a thought to promoting an otherwise proprietary product, I absolutely need my Swiss Army knife. As there are several, let me list the essential blades and attachments. Besides the large and small blades, which are very good at doing the intricate bamboo splits, my favorite blade is the saw. The arrangement of serrations makes the saw very effective in cutting precise incisions in bamboo. It is also effective at slight edge alterations—from holes to mitres. The saw can also be used to auger a hole up to about ½" in diameter, if initiated by another tool, the leather punch, also used as an auger.

Vise Grips: An essential tool for grasping the wire ends and twisting to achieve a tightly wound binding. It can lock on the wire with super-human grip, allowing a twist to tighten the loops.

Wire Cutters: A wire cutter is used to cut off the excess wire that you usually use to prevent splits from traveling too far.

Glue: A good wood glue, preferably one that dries clear, works best.

BAMBOO ANATOMY TERMS

Branch Scar: The point on the node where a branch would emerge. Often, lower nodes do not have branches, only the unemerged branch scars. These are alternately arranged on proximal nodes (one side, then the other).

Culm: A long tube with regularly spaced membranes, or node septums, designed to prevent collapse of the tube under undue lateral stress.

Internode: The smooth tube between the nodes. The lower internodes are thicker and shorter, gradually progressing to longer internodes with thinner walls as you go up the culm.

Lignin: An interconnecting fiber that is slowly deposited in the wood of bamboo, making it stronger in tensile strength. It is this deposition that makes culms older than about four to five years a better choice for harvesting.

Node: A visible seam circumscribing the culm, delineating a solid membrane that traverses the internal void. This is the growth point. The straight grain of bamboo gets confused here, and it is less likely to split.

Septum: The brittle and easily removed membrane across the interior of the culm at the node.

Skin: The outside surface of the bamboo—hard and thin.

Wall: The full depth of the culm “wood,” varying in thickness according to species and culm section. The wall thickness is a variable dependent on species and height of the culm internode. Lower wall thickness is greater, getting thinner the higher up the culm you go. For the purposes of this book, thick-walled bamboo averages $\frac{5}{16}$ “ to $\frac{3}{4}$ ”, while thin-walled bamboo is $\frac{3}{16}$ “ to $\frac{1}{4}$ ”.

TIPS FOR WORKING WITH BAMBOO

What makes bamboo so great to work with? First, it has a natural finish. The culm, with its hardened silicon-rich skin, needs only to be cleaned and polished. The patina of the surface varies with species but most are very pleasing to the touch and to the eye. Bamboo is round, generally hollow—a tube with periodic nodes that are solid. As a lightweight structural member, it has no equal.

Splitting: Bamboo grain lends itself to perfect, precise, straight splits. This can be used for many applications, the highest form of which is exemplified by the Japanese tea whisk. Bamboo is flexible; it has a high tensile strength as well as compressive strength. It can be distorted to a great degree, yet maintain the ability to return to its original shape. Split bamboo allows even more distortion and is the basis for many other applications, perhaps the most famous being the bamboo fishing pole. Whatever your particular project, recognition of bamboo split character and management is essential.

1. The node is a natural barrier to the progression of a split. If a short split is desired, the node is always the terminus. As insurance, I generally wrap the bamboo, either at the node or between the node and the splits, with 18- to 20-gauge brass or galvanized wire. Two to three loops usually allow an easy cinching. The wires are twisted together, making sure there is only one overlap of the loops. Using a Vise Grips, the wire can be grasped, pulled and twisted to tightness. The excess wire is cut off with a wire cutter, and the end is pushed neatly against the bamboo culm. The wire can fail if twisted too much or if not twisted evenly. I have used twine, cotton string and stretchable electrical tape. The choice depends on function and aesthetics. Your call.
2. When a design calls for a split through a node, a little extra effort in splaying the split will generally work. However, due to a confusion of grain within the node, the split may not emerge in perfect alignment with the original split. If the splits are few, perfection is not an issue. If splits are many, adjacent splits can merge, with resulting frustration. Careful node splits with a knife can reduce this possibility, but generally many splits through a node are not advised.
3. When using whole culms of any length longer than a couple of internodes, the tendency to split needs to be reckoned with. When I make floor lamps, the top and bottom of the whole culm are bound in wire, preventing the progression of the splits at the base and the shade. If a particular application allows, a pre-split whole culm will prevent the creation of any additional splits that are due to rapid changes in temperature and humidity. A design that incorporates splits is an effective strategy against them.
4. Splits should always be made by splitting the culm, or culm section, in half. This technique can be done progressively up to sixty-four splits around the culm. I have done 128 with large diameter and straight-grain bamboos (*B. tulda*). If splits are made off center of half, they tend to progress towards the thinner side, which accentuates the imperfection. Therefore, care in making the first incision with a knife into the end grain cannot be emphasized enough when making many splits, as in a lamp shade. However, if a split does not work out, the thinner portion can be removed, with a yank, and will not be missed by even the most scrutinizing observer. This will be your secret.
5. Splits should be made such that the direction is always through the center of the culm, the shortest distance across the outer wall. I have done off-center splits, taking a section off the culm. Again, the split tends toward reducing the smaller split-off section. It is manageable, but an issue.

Safety: I would be remiss if I failed to address a character of bamboo that may raise its ugly head most unexpectedly. ~~As bamboo splits very cleanly, it also splits very sharply.~~ The sharp edges can cut the skin, and care must be taken to avoid a run for bandages. I have run a blade at a right angle along the edge of concern. The blade will remove a sliver of edge and thus round it off.

Joinery: The tube shape of bamboo restricts the variety of joinery techniques. Much research has been devoted to joinery with emphasis on strength, as the joint is generally the weakest link in a bamboo structure. However, good design can alleviate much of the strength requirement and allow simple joinery techniques.

1. A fundamental architectural rule of structural integrity is triangulation. A triangle prevents distortion and is a good technique to prevent stress at joinery. With triangulation, bamboo can be mitred. If cuts are made precisely on the same culm, with the same orientation, the mitre approaches perfection in surface irregularities—both legs of the mitre have the same imperfections and are matched. With precise cuts, the end grain of the bamboo can be matched and glued. The difficulty of setting up a jig to press the joint together while the glue sets has led me to use electrical tape. The tape stretches, exerts substantial pressure on the joint, and allows it to set.
2. The mortise and tenon is probably the most used joinery technique. It is simple but requires the diameter of the tenon bamboo to be less than the interior diameter of the mortise bamboo. With a hole saw and some whittling, the joint can be done quickly. A dowel drilled through the side of the bamboo joint to the other side secures it. The joint is not rigid. Subsequent rigidity must again be accomplished by triangulation. Triangulation can be done with wire, under tension, in some circumstances.
3. Another effective joint is interwoven bamboo splits, oriented end to end. This is used in a variety of applications, many as split bamboo lamp shades. The bamboo ends are split into equal numbers, either 8, 16, 32, or 64, and interlaced.
4. Smaller-diameter bamboo pieces can be wedged into the cavity of a larger bamboo. Again, the smaller bamboo is split, and a bamboo ring is pushed into the end to splay out the splits. The splits will compress into the larger bamboo. With glue, it can be made permanent. This is one technique for inserting a lamp socket holder into a split bamboo shade.
5. A general rule, with exceptions, is the need to keep all joinery 1:1. A joint can join two pieces coming from different directions, but it is very difficult to make a decent joint for three bamboo pieces. The third should be designed to join at some other point, as a mortise and tenon.

Attachments: Because of its tendency to split, bamboo should not be nailed unless pre-drilled with a similar-diameter drill bit. Screws and dowels require pre-drilling as well. It helps to have a full set of drill bits that accurately match the various sizes of hardware.

1. Whole culms can collapse when a screw or nail compresses it. Being careful not to compress a screw or nail is one preventive technique. If a hollow bamboo dowel is fitted into the larger bamboo from the opposite side, a much tighter joint can be accomplished, as the dowel compresses against the outer bamboo wall.
2. Butt joints of bamboo to wood require an internal wood or bamboo dowel that fits the interior diameter of the bamboo. This is cut short enough such that it can be attached to the wood surface with a long screw. The bamboo is then secured to the dowel. Very tight joints can be

accomplished if the dowel screw is from the backside of the wood surface. Attach the bamboo to the dowel, then tighten down on the dowel.

Bamboo Holes: The tendency of bamboo to split is both an exploitable design advantage and an unavoidable construction disadvantage. Splits, when desired, are easily achieved with a technique respective of bamboo morphology. A design that exploits bamboo splitting is fundamental to good bamboo design. But there are times when a split is not desired. Most bamboos will split when a nail is driven through the skin. The nail acts as a wedge to pull the straight grain of bamboo apart. Consequently, drilling is required.






1. Normal drill bits can work fine, assuming they are sharp. However, a slow and gradual technique is desirable to prevent a sudden penetration of the bamboo wall, which is not very thick and easy to go through. I have used Forstner drill bits, and they work great. They cut the outer edge of the hole first, making a clean cut.
2. A hole saw works in a very similar manner, but some precautions are necessary. The central guide hole must be made slowly and carefully. This prevents breaking through the wall suddenly and subsequently slamming the hole saw teeth on the bamboo skin. Once the wall is penetrated with the guide bit, the hole saw is gently started on the bamboo. The hole is gradually completed, and once again care must be taken to prevent a sudden breakthrough. Once through, the bamboo hole must be removed from the hole saw bit. It may be necessary to remove the central guide bit once the hole saw has established a groove. This prevents the guide bit from penetrating the opposite sidewall of the bamboo. However, if the hole is intended to go completely through the bamboo, the guide hole can be used to start the hole from the opposite side. A hole pushed through from the inside out will splinter and is to be avoided.
3. Most holes are made at a right angle and are easily made. However, some designs may require a 45-degree angle. A normal bit can be started at a right angle, then rocked back to a 45-degree angle to complete the hole. The hole saw is done in a similar manner.

FUN & FUNCTIONAL

CANDLE LAMP EASY

Perfect for an outdoor party, or as a dining room centerpiece, this candleholder is easy to make. Summer flowers add scented delights!

Materials

-  *Thin-walled bamboo 3" -5" in diameter*
-  *18- to 20-gauge Brass wire*
-  *Glass candleholder*
-  *Candle*
-  *Flowers*

Tools

-  *Knife*
-  *Pencil*

Step One: Cut a piece of bamboo at a 90-degree angle just below a node (the section where two pieces of bamboo are joined), and again 10" above the node (fig. 1). This is the top of your bamboo.

Step Two: Draw a ring around the culm 3" above the node (fig. 1).



Step Three: Make an incision into the top end of the bamboo. The knife will initiate a split. Split the bamboo until it reaches the drawn circle. Make a second split on the opposite side of the stalk (fig. 3).

Step Four: Repeat splitting into $\frac{1}{4}$ " sections, $\frac{1}{8}$ " sections, $\frac{1}{16}$ " sections, and so on until the width of the bamboo between the splits is about $\frac{1}{4}$ " wide—like slicing a pizza (fig. 2).

Step Five: Pull out every other section of split bamboo at the pencil mark (fig. 1).

Step Six: Fit a glass candleholder within your bamboo, and place a candle in its base (fig. 2).

Step Seven (optional): For an extra touch, arrange flowers within the bamboo slots.

 *Figure 1* 

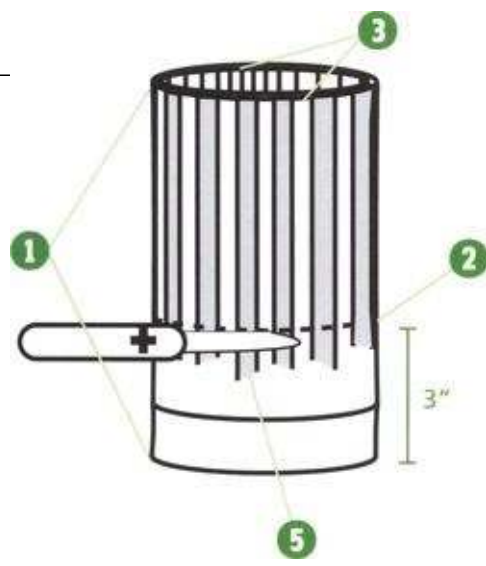
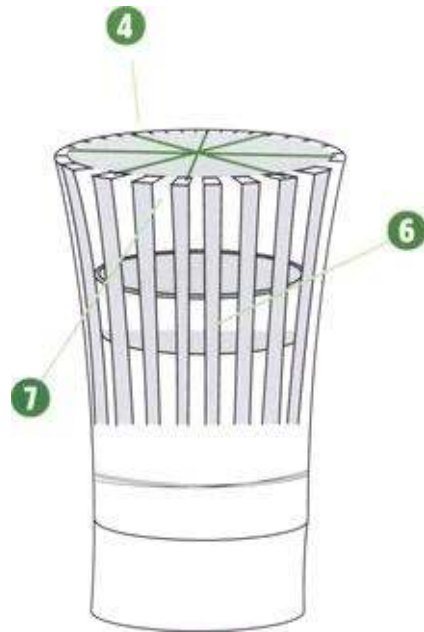


Figure 2









PICTURE FRAME EASY

Whether framing a work of art or a favorite photo, bamboo's rugged texture and neutral colors will accent most pictures.



Materials

-  2 bamboo culms 10" long
-  2 bamboo culms 8" long
-  6 feet of twine
-  4 bamboo branch segments 2" long

Tools

-  Saw
-  Drill and Drill Bit Set
-  Hole Saw Kit

Step One: Select your materials and cut the bamboo to the specified dimensions for an 8" x 10" picture frame.

Step Two: With the hole saw, cut the holes by going through the backside of the bamboo with the guide bit to receive the horizontal bamboo pieces as in figure 1.

Step Three: With a drill, make a hole complementary to the twine diameter at the inside corner of the

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