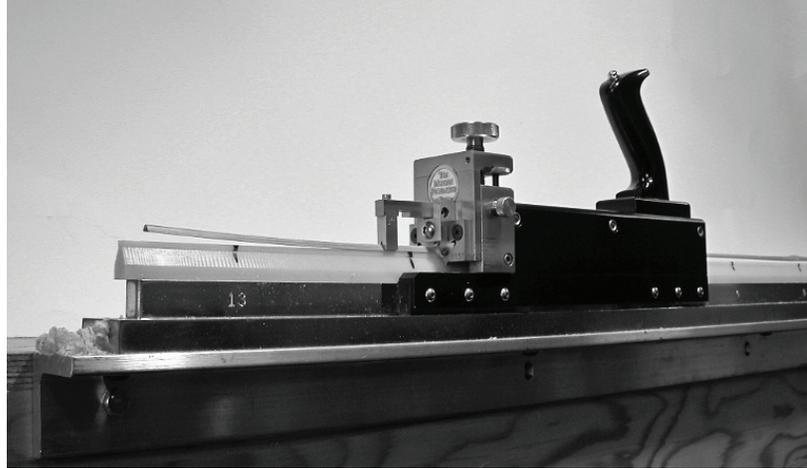


INTRODUCTION



The Morgan Bamboo Hand Mill represents a complete departure from traditional methods of hand-planing bamboo strips to make fly rods. The simplicity of the Hand Mill design allows a beginning rodmaker to plane a strip as perfectly as a master. The Hand Mill consists of two basic parts, an adjustable hand plane that holds the cutters and an adjustable bed that holds the bamboo strip. The plane and bamboo are self-aligning on the bed. Unlike some power mills when planing strips with the Hand Mill the grain of the bamboo is followed. The Hand Mill bed assembly, which is 72 3/4" long, allows one to plane two-piece rods up to 9 feet and various length three-piece rods.

With the Hand Mill, the cutting is done with two long-lasting, removable carbide inserts that have three cutting edges. The cutters are designed to cut only the bamboo, thus the cutting edges remain sharp for a considerable time and, from my experience, three to five rods can be completely planed from one set of cutters. When the three edges of the cutters become dull, they are quickly and inexpensively replaced eliminating the need to sharpen planes: a difficult to learn and time consuming task. The inserts are standard and can be purchased from different suppliers.

With the two carbide inserts mounted in the cutter head, the Hand Mill cuts both sides of the bamboo at once while maintaining the correct bevel angle, so you never have to stop during the cutting process to make sure the angles are correct. The taper, which is set by the user in the adjustable bed, raises the bamboo strip into the carbide cutters resulting in a perfectly tapered strip when cut. Once the taper is set, one can cut as many strips as needed that are consistently the same resulting in glued sections that are amazingly accurate and consistent. With these advantages, the Hand Mill finishes strips very quickly, saving considerable time compared to traditional hand-planing. The plane easily allows you to bevel a rough strip split from a culm--a job that is normally difficult with other methods of hand planing. The plane is supplied with a regular plane handle providing another big advantage of using the Hand Mill: one uses the large upper body muscle groups and legs to do the cutting, rather than the forearm and wrist, which is much easier.

With both hand-planing and Hand Milling the bamboo strips need to be straightened at the nodes prior to cutting for best results. Even with this straightening cutting a strip with a hand-plane sometimes results in a node chipping out resulting in a damaged strip. The Hand Mill effectively eliminates this problem. In fact, I have been very surprised that the Hand Mill cuts strips better and with virtually no loss compared to the power mill I used to use.

My cousins, who own Siskiyou Design, a sophisticated manufacturing company that makes medical equipment and laser research equipment, manufacture the heavy-duty plane specifically for the Morgan Bamboo Hand Mill. I have a long history of working with them, and I know I can count on their superior workmanship. Beginning in 2004 I started working with their design engineer, Dennis Detloff, on a new plane design. We completely redesigned the plane and tested one for over a year in our own shop before finalizing the design. The working principle is exactly the same as in the previous design, and, though it doesn't cut strips any more accurately than before, it has some very desirable features that I will describe. This new plane will be delivered with all new Hand Mills beginning late in 2005.

As with my most recent design, the adjusting head assembly, slide, and lead screw are fabricated from stainless steel for durability and rust resistance. The height adjustment is clearly marked with a calibrated dial indicating movement of .002". By careful adjustment, vertical accuracy of .001" can be achieved. Instead of hand-fitted slides, it has a traditional dovetail slide with a gib for positive tension adjustment, and it is easily adjusted whenever needed. The plane side rails are black anodized aluminum with replaceable inserts made from reinforced nylon impregnated with molybdenum disulfide that provides a very slippery, long-wearing surface for it to ride on as it travels down the bed. In addition, the aluminum insert holders can be adjusted with a jig supplied with the Hand Mill to take out any excessive side-to-side clearance caused by wear. In the unlikely event that the inserts wear too much, they can be easily and inexpensively replaced.

An innovative new design is used to eliminate endplay in the lead screw. If the endplay changes after substantial use, the user can easily readjust it. The backlash has also been eliminated from the slide making the depth adjustment feel very positive. Because the plane is a little heavier than the previous models, it feels very substantial and solid.

Joe Byrd, a Hand Mill user, invented an accessory for the original planes called an adjustable hard stop. With Joe's generous permission, I have incorporated a hard stop into my new Hand Mill plane design. This stop allows the user to set the cutter head travel to the finish depth dimension for exact repeatability on every final cut without checking the dial setting. Therefore, every strip is cut precisely the same resulting in glued sections that are amazingly uniform in flat-to-flat dimension. We, along with many other Hand Mill users, have found this to be a significant improvement. The new design is quick and easy to set with a thumb screw adjustment and a brass locking screw. One distinct advantage of the Hand Mill is the option to cut 8-, 6-, 5-, or 4-strip rod sections by merely changing the cutter head, a quick and easy task. The standard cutter head is for 6-strip rods. This versatility has greatly increased the interest in making both 5-, and 4-strip rods.

Normally, bamboo rod-makers plane or bevel strips for 6-strip rods with a 60-degree angle. Before inventing the Hand Mill my extensive bamboo cutting experience at Winston Rod Company was always with a milling machine using cutters with the slightly larger included angle of 61.5 degrees. This experience proved to me that you greatly reduce the chance of having visible glue seams when strips cut with the 61.5 degree angle are glued into sections. When inspecting rods glued up with the larger included angle, I have found that they are structurally very strong and just as sound as 60-degree cut strips with no noticeable increase in internal glue space.

As a result of this experience I introduced to bamboo rodmakers cutter heads that have this slightly larger included angle and they have been very well accepted by Hand Mill users. My cutter heads for 8-strip rods are 46 degrees, 6-strip rods are 61.5 degrees, 5-strip rods are 73.5 degrees, and 4-strip rods are 92 degrees.

The Hand Mill bed assembly consists of the base that the plane rides on, the adjustable bed for setting a taper and guiding the plane, and a plastic anvil that the bamboo sits on during strip cutting. The base and adjustable bed are cold rolled steel and are chrome plated to protect them from rust. The adjustable bed for setting the taper has easily adjusted push/pull screws every 5", the standard for hand-planing. The taper is set using the adjustable bed, not the anvil; as a result, the bamboo sits on top of the anvil that doesn't wear as the strips are cut. A precision dial indicator with 0-1" travel and .001" accuracy is provided for accurate bed adjustment. Provided with the Hand Mill is a weight to apply pressure to the plane when setting a taper. This pressure replicates that which occurs when you are milling strips so this procedure insures accurate taper setting. Re-setting the taper is a simple and fast procedure.

One of my customers, John Miller, designed an important improvement for mounting the Hand Mill base to a bench. John mounted his base on an aluminum angle that is fastened to his bench. The angle has holes drilled through the top of the angle to allow access to the anvil hold down screws and slots cut for the adjusting screws.

I discovered that by mounting the base on the aluminum angle, two important things are accomplished: First and most importantly, the setting and cutting accuracy is improved. The aluminum angle and base are bolted together in seven places to eliminate any flexing between the two and thus make a very rigid unit. As a result of this rigidity and the aluminum angle, the Hand Mill accuracy is no longer dependent upon how flat and true the workbench is. When your tapers are set using this method, they remain precisely where they were set. Second, you can set your tapers and remove the anvils without taking the base off the bench. This arrangement saves considerable time when setting tapers and changing anvils during strip cutting.

One question that is often asked by Hand Mill purchasers is the recommended height of the bed. For most users the standard bench height of about 36" is satisfactory. However, there are two other considerations: first, how tall is the user and, second, how much strip cutting will be done? If the user is tall and a lot of strips will be cut then having the base about belt height definitely is easier on the back. This can easily be accomplished by building a simple plywood box to mount the aluminum angle and base. Another question that is sometimes asked is how much space is needed at each end of the base so I recommend allowing approximately 18" clearance on both ends.

I, along with my assistant Bill Blackburn, designed a combination dial indicator holder/shaving tool that not only holds the dial indicator but also provides a method of truing the top of anvils. This unit mounts in lieu of the cutter head and puts the dial indicator just ahead of the point where the bamboo is cut resulting in very accurate measurements. Another design feature is if you are truing an anvil it's easy to remove only the dial indicator and to readjust the truing cutter for precise anvil shaving.

The dial indicator holder/shaving tool holds a regular carbide insert perpendicular to the anvil so that when the anvil is trued the top is flat. Since the anvils are flat on top they will accommodate bamboo strips that have the natural outer curve of the bamboo or, if the user flattens the enamel side of the strips, they will also accommodate flat strips. In the event that an anvil eventually wears or gets damaged, it can be easily redressed with the new shaving tool.

The new dial indicator holder/shaving tool is made from aluminum and is clear anodized for good durability. The standard dial indicator supplied with the Hand Mill fits into the tool and is held in place with a stainless steel set screw with a nylon tip to prevent damage to the indicator barrel. Included with it is a carbide insert and screw along with two button head screws to attach it to the Hand Mill slide. The new shaving tool can be used for limited shaving of bamboo strips to flatten them on the pith side but won't hold up nearly as well as the tool steel flat cutter head for long term use.

Ingvar Nilsson, a Hand Mill user in Sweden, designed the original dial indicator holder that fit on the front of the Hand Mill and even though it was somewhat different from ours I appreciate and acknowledge his creativity.

The Hand Mill comes with two tip- and one butt-finishing anvils for tapering both types of strips. The two tip anvils are supplied so that very fine tips in addition to regular tips can be milled. It also comes with a tip- and a butt-roughing anvil for preliminary beveling of strips. For those users who use a power beveler to the rough cut their strips most users change to three finish tip and two finish butt anvils. The anvils, which can be quickly and easily changed, are machined from High Density Polyethylene (HDPE) plastic. The anvils have brass inserts melted into the bottom that provide long lasting threads for the screws to attach them to the adjustable bed and brass inserts pressed in for the screws that hold down the bamboo. The bamboo strips are held onto the anvils with a screw for ease and security. A substantial number of rod makers use a power beveller to rough out strips prior to planing them with the Hand Mill. By removing the head of the regular hold down screw and fastening the strip to the remaining pin, these strips can easily be held for Hand Mill planing.

The Hand Mill comes with a swelled kit that allows the user to cut strips for the traditional swelled butt rod designs. The kit consists of precision plastic shims of .010", .020", .030", and .060" thickness and instructions. With this kit one can make swelled butts from .020" to .120" high in increments of .020" extending over 2.5".

The Hand Mill is provided with a hold down shoe that, once the initial apex has been cut, securely holds the bamboo strips during the entire planing process. The hold down shoe has substantially improved the cutting characteristics of the Hand Mill by providing a stabilizing alignment hold down in front of the carbide cutters. It has been

helpful with quad strips, in particular, because they are difficult to cut because of the low angle and stiffness of the sections.

The hold down shoe assembly consists of three parts: a body, a pivot arm, and a shoe. The whole assembly is fabricated from 303SE stainless steel that assures longevity and rust resistance. It mounts easily with just one screw in the present hole in the center of the cutter heads. The area directly in front of the cutters is flat and doesn't have any gap between the cutter head and hold down shoe assembly to prevent the accumulation of chips.

The pivot arm that holds the shoes is spring loaded to hold the bamboo strips down and to provide enough force to keep the bamboo strips centered within the shoe. The front of the arms has two slots to hold shoes; the first arm slot is about 1.80" from the cutters, and the second slot is about 1.40" from the cutters. Some rod makers prefer using the shoes in the front slot, whereas others prefer the rear slot. The attaching holes in the pivot arm are slotted side-to-side about .030" so the shoes can be centered on the cutters.

There are three different hold down shoes of 61.5 degrees, 73.5 degrees, and 92 degrees for 6-, 5-, and 4-strip rods respectively. If more than one cutter head is ordered, the appropriate hold down shoe will be supplied with each head. The shoes, which will hold even the smallest tip, are beveled in front so they slide easily on bamboo strips without digging in or catching. Because the shoe is ahead of the cutters, a final cleanup cut will always be made on the bamboo. Once the hold down shoe is mounted and centered on the bamboo strip, its use is automatic.

The hold down shoe provided with the Hand Mill should be used when cutting both tip and butt strips once they have been beveled enough for the shoe to ride on the strips. Some of the photographs shown in the manual don't show the hold down shoe installed.

I think that it would be instructive here to briefly explain the Hand Mill cutting procedure in its entirety so you can understand how easily and quickly the Hand Milling proceeds. Once the strips are split out of a pole, the nodes are prepared, and the strip is straightened you drill a hole in the center of the strip so you can mount it on the anvil. Prior to rough cutting most users have set a taper in the adjustable bed so that as they rough cut the strip it also being tapered.

The Hand Mill is designed to take many small cuts on the bamboo rather than removing a large amount with a few cuts. Since a strip is square in the beginning you are cutting only the edges and, in addition, it is generally not heat-treated so you can cut a depth of at least .010" per cut. As you cut the strip down and the surface area on each side increases the cutting depth per cut is gradually reduced to a depth of cut to .004"-.006" per pass. When you are rough cutting it is easy to take three, four, or more cuts per minute once you establish a rhythm to the cutting and have determined the depth of cut on each pass. The adjusting screw on the Hand Mill with its calibrated dial lets you quickly and accurately adjust the depth of each cut. Since you never have to check the angle or sharpen blades the cutting is straightforward and goes quickly because you are cutting both sides at once.

After the butt rough cutting is completed the anvil is changed and the tip rough cutting proceeds. Changing anvils takes fifteen minutes or less. During the tip and butt rough cutting the same taper can usually be used since the strips are still over-sized. One procedure that speeds up overall rod production is to rough cut several sets of rods at one time and finish taper them as needed.

Once the rough cutting is completed you change to a finish anvil, set the taper, and begin cutting. A good time estimate for changing anvils and setting a taper is thirty minutes. For most users the bamboo would now be heat-treated so the cutting must proceed slower since the bamboo is harder and cutting is more difficult. When cutting heat-treated strips with the Hand Mill a cut of .001”-.003” per pass is appropriate. Each user has their own standard for sizing strips after heat-treating but to give you an idea we like to have our strips .040”-.050” oversized. Naturally, the closer to a finished size you can get the quicker the cutting goes.

The addition of the hard stop on the plane makes finish cutting very easy and accurate. Once the correct strip size is determined and one strip cut to that size the hard stop is set. As you change strips the cutter head is moved up until it just clears the strip then adjusted down on successive cuts until it hits the hard stop. Thereafter, each strip milled has exactly the same taper as previous ones and exactly the same height. When these strips are glued together the resulting sections are all the same and the flat-to-flat dimensions are amazingly close.

I am very excited about the Morgan Bamboo Hand Mill. Soon after I bought the Winston Rod Company in 1973, bamboo rods began to lose their popularity in favor of graphite rods. It is very satisfying to me to see the resurgence of interest in making and fishing bamboo rods. I grew up fishing bamboo rods and know how wonderful they are. It has also greatly increased the interest in making both 5-strip and 4-strip rods because of ease of cutting these strip configurations by just changing the cutter head. I hope that the ease of planing strips offered by the Hand Mill will remove some of the difficulty long associated with bamboo rodmaking that has held many people back from such an enjoyable pursuit.

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