stewmac®

ACOUSTIC GUITAR SIDE BENDING MACHINE



How to assemble, operate, and start bending sides



CONTENTS

We strongly recommend you read all of this book before you assemble and use your bender. Understanding how each part of the bender works will give you better and more consistent results. Take note of all of the safety warnings and do several dry runs to familiarize yourself with every step and process.

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PART 1: ASSEMBLY AND OPERATION

GETTING STARTED

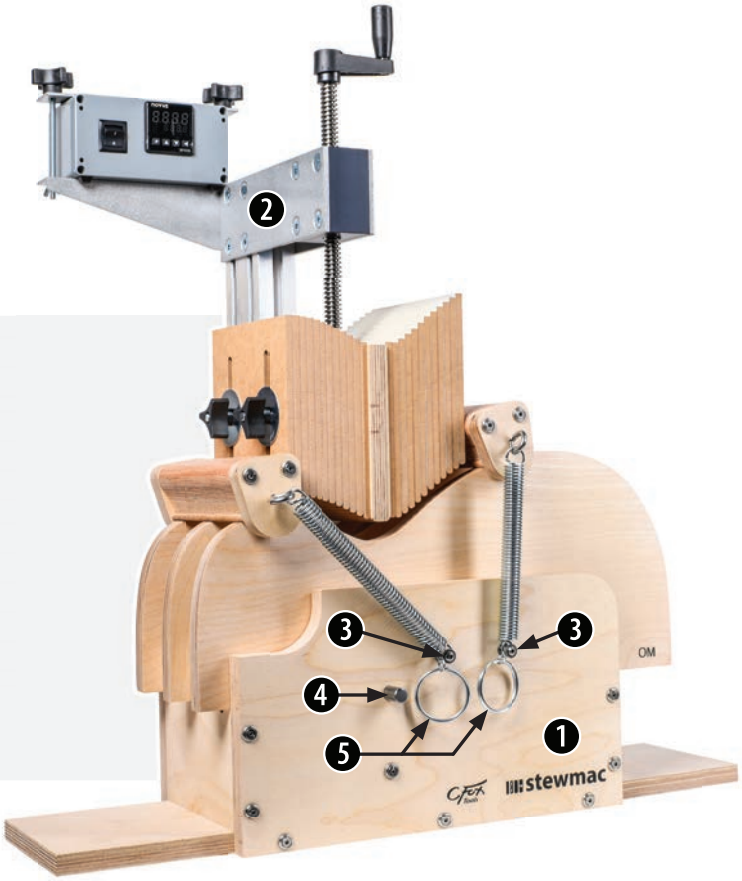
These instructions cover assembling and operating the StewMac Acoustic Guitar Side Bending Machine and all its available parts and accessories. This includes all optional components you may choose to add in the future.

Required tools and supplies

- Socketed screwdriver for included Torx bit
- Phillips head screwdriver
- 3/16" Allen wrench
- Heat-resistant gloves
- Heavy-duty clamps (at least two) to secure the bender to a work surface

CAUTION

This bender uses **VERY** high heat and strong springs under high tension. Be careful at all times to reduce your risk of injury. Always be aware of the temperature and where the springs attach and ensure they are properly secured at all times.



Useful terms to know

1 Logos indicate the **front side** of the bender.

2 The **waist clamp** forms and bends the waist shape.

3 The **spring mounts** are used to connect the tension springs to the base of the bender.

4 The **alignment rod** provides both an alignment point for the bending forms and anchor points for the optional Cutaway Ram.

5 The **ring handles** are use to grip the tension springs when hooking and unhooking them.

ACOUSTIC GUITAR SIDE BENDING MACHINE PARTS LIST #6220



Base



Torx bit



Torx screws (4)



Countersunk washer



Bending form alignment rod



Phillips head screws (4)



Spacers (4)



Small washers (6)



Medium washers (2)



Pressure bars (2)



Waist clamp



Contour plates (24)



Carriage bolts (2)



Large washers (2)



Knobs (2)

HEATING BLANKET + STRAPS SET FOR SIDE BENDING PARTS LIST #102130

Included in the system and also sold separately.



Heating Blanket (#6223 also sold separately)



Mini clamps (4)



Stainless steel bending straps (3) (#101797 also sold separately)

CAUTION! Take extreme care when handling the stainless steel bending straps. The edges of the straps are sharp. Always wear protective gloves when handling.

BENDING FORMS FOR ACOUSTIC SIDE BENDING MACHINE

Sold separately.

#101845
DREADNOUGHT



#102134
DREADNOUGHT CUTAWAY



#101842
OM



#102133
OM CUTAWAY



#101839
000



#102132
000 CUTAWAY



#101848
J-45

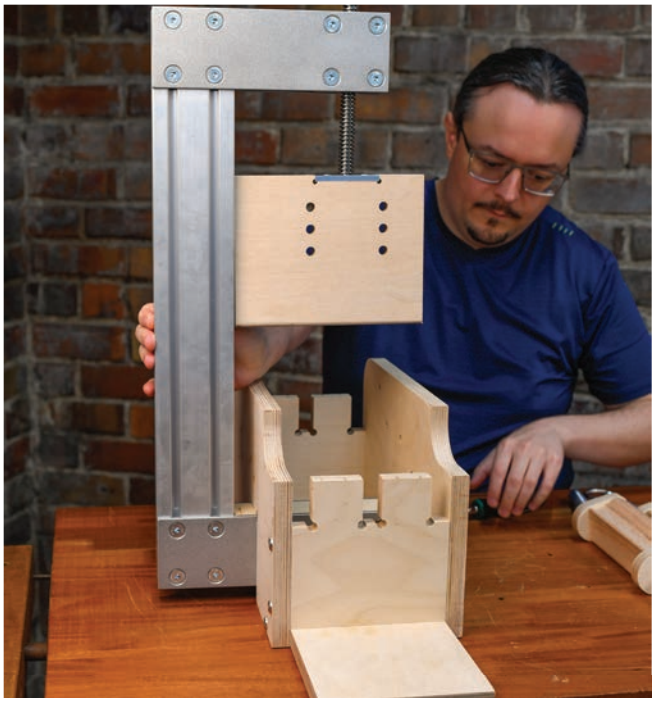


#102135
J-45 CUTAWAY



BUILDING THE BENDING MACHINE

Place the base on a flat surface. Locate the bottom of the waist clamp opposite the hand crank, it has a wood core. Insert it into the opening in the rear of the base (non logo side) completely until it touches the interior front side of the base.



While supporting the waist clamp, locate the small pre-drilled hole on the front of the base as shown. Place the Torx drive screw though the countersunk washer and screw together the base and waist clamp. The Torx bit is included.



Lay the now-connected base and waist clamp on the back of the waist clamp. Install the three Torx drive screws in the pre-drilled holes in the base and wooden insert of the waist clamp and tighten. Install these in tandem for even pressure. Sit the bender back upright.

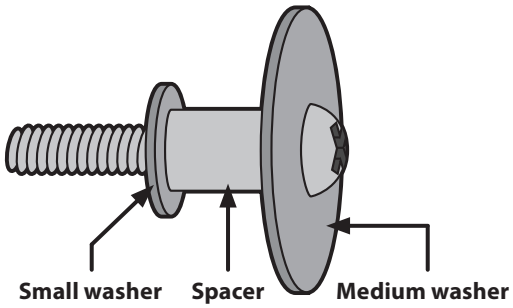


Install pressure bars

Locate the two pressure bars. There is a spring on each side, one side has a ring handle attached to the spring hook, one does not.

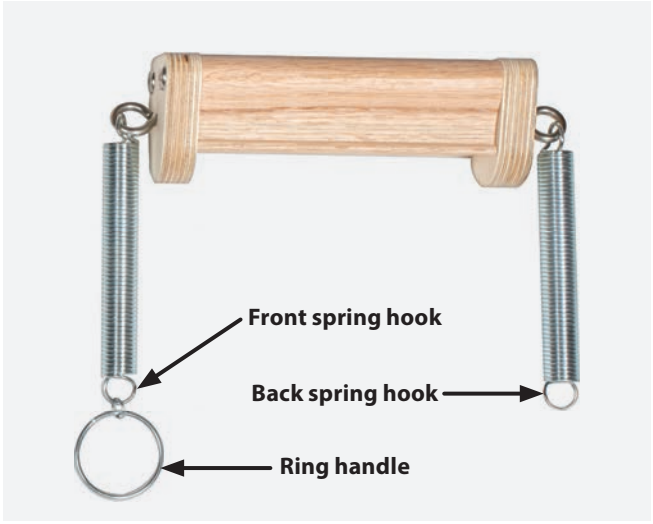
The ring handles are used to help you connect and disconnect the spring hooks to the front of the base. The back spring hooks are secured permanently to the base with the back spring mounts.

Each mount will consist of one Phillips head screw with a medium washer, a spacer, and then a small washer as shown. Assemble two of these mounts.



Attach the back spring mounts to the spring hooks without ring handles. The medium washer must go into the end of the spring as shown to secure the spring in place.

Keeping the springs attached to the back spring mounts, install them into the two threaded inserts pre-installed in the back of the base.

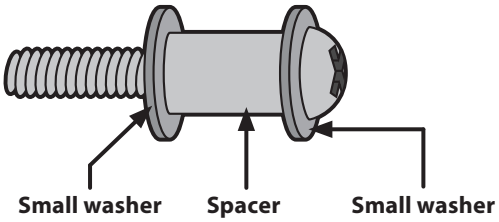






Install the front spring mounts

The front spring hooks will attach and detach from the front spring mounts. Each mount will consist of one Phillips head screw with a small washer, a spacer, and then another small washer as shown. Assemble two of these mounts.



Install the two front spring mounts into the front of the base as shown, through the two threaded inserts pre-installed in the base. There may be a very thin layer of wood covering the front side of the holes; you'll remove it when installing the screw.



Test fit the pressure bars

Place the pressure bars on top of the base, with their rounded sides facing down.

CAUTION

Attaching the pressure bar springs will put them under considerable tension. These powerful springs can snap back, causing injury. Always handle the springs by using the ring handles, using extreme care.



Test fit each pressure bar by attaching the spring hooks to the front spring mounts on the front of the base. Make sure the spring hook, NOT the ring handle is secured to the mount. The ring handles are for moving the springs only.

Test that the pressure bars can move freely and unobstructed. Once the Bending Forms are installed, they will be under considerable tension.

Unhook the pressure bars and move them out of the way.



MOUNTING THE BENDING FORMS

Insert the bending form alignment rod all the way through the large pre-drilled holes in the front and back of the base.

When fully inserted, the rod will contact the waist clamp. The rod will serve as the locating pin for the Bending Forms. The rod will protrude on the front and back sides of the base, as it will also function as a mount for the optional Cutaway Ram (covered later).

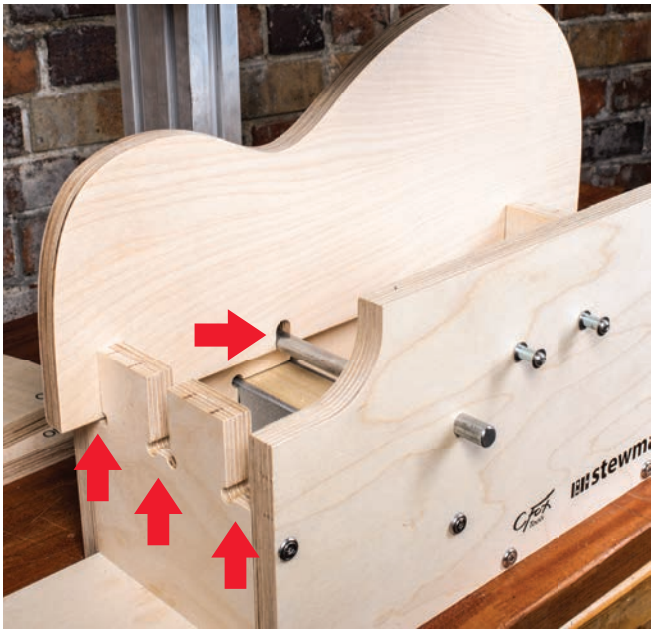


CAUTION

DO NOT attempt to hook the pressure bar springs to the bending form alignment rod. It will not hold securely. The springs could release and cause injury.

Install the three matching Bending Forms into the slots in the base. Orient the Bending Forms so that the upper bouts are on the left when facing the bender.

Mate the notch on the bottom of the Bending Forms to the bending form alignment rod to lock them in place.



IMPORTANT: Before reattaching the pressure bars with the Bending Forms in place, you must secure the base to a solid, non-moving surface. We recommend at least two heavy-duty clamps or screwing it down permanently.

There is a pre-drilled hole in the center of the base should you choose to screw it to a workbench. You can also use this hole to install a large fender washer behind the head of the screw to allow the bender to swivel.

CAUTION

Attaching the pressure bar springs over the Bending Forms will put them under considerable tension. Use extreme care and always handle the springs by using the ring handles.

Test fit the pressure bars over the Bending Forms

Place the pressure bars onto the Bending Forms in the waist with their rounded sides down. This will put the springs under the least amount of tension, making it the safest location for attaching and detaching the springs.

Use the ring handles to attach the spring hooks to the front spring mounts. Again, make sure springs hooks, not the ring handle, are secured on mounts. This will take considerable physical effort.



Test that the pressure bars slide over the Bending Forms and ride over the sides of the forms as shown. Make sure the pressure bars are properly seated on the Bending Forms at all times. During the actual bending process, the pressure bars will be riding against the smooth steel straps and will be easier to slide.

Unhook the pressure bars and move them out of the way.



SETTING THE WAIST

Install the waist contour plates

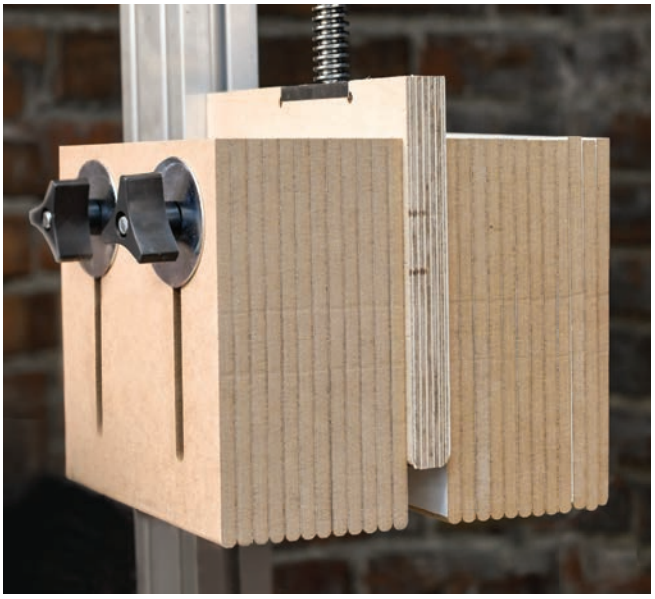
Arrange twelve of the contour plates into a stack with their slots aligned and rounded edges facing down. Insert a carriage bolt through both slots in the stack.

Holding the stack firmly, slide the carriage bolts through the middle two holes on the center plate of the waist clamp.



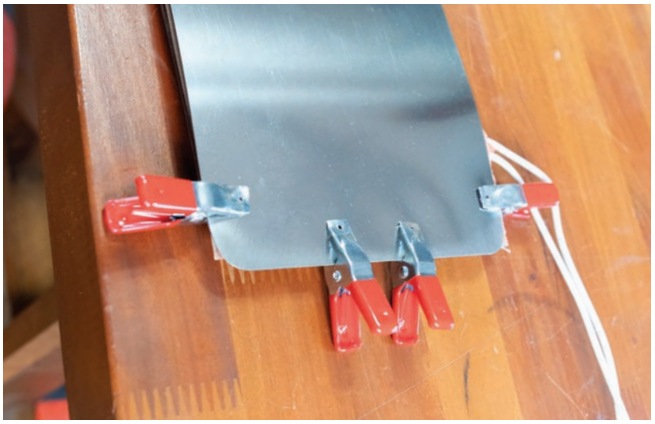
Stack the remaining twelve contour plates (rounded sides down) and slide them onto the carriage bolts sticking through the center plate.

Install a large washer and knob onto each carriage bolt. Tighten the knob to secure the plates together.



Set the waist

To set the waist, you'll do a dry run without heat or a wood side, using only the straps and blanket. Place the three steel straps on a table with the Heating Blanket between the top two straps and clamp together. Use the provided clamps, remove rubber tips because they will melt. Attach the clamps to the lower bout end where the Heating Blanket cord attaches.



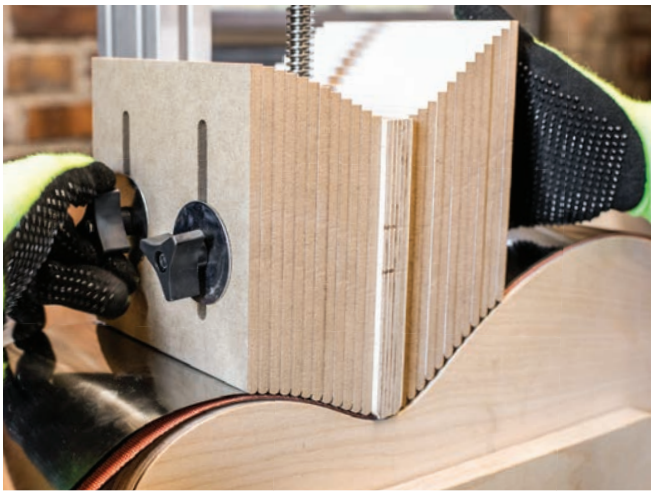
Place the straps and blanket on top of the Bending Forms. Orient the Heating Blanket so the cord faces the back of the bender, as it will plug into the back of the Temperature Controller later. Make sure the straps are aligned evenly over both ends of the Bending Forms.



Slightly loosen the two knobs holding the contour plates together so they can move freely. Crank the waist clamp down until the straps and blanket conform to the waist shape.

With your hands, push down on top of the contour plates until they are all contacting the top strap firmly. Tighten the knobs firmly to lock in the waist shape.

Crank the waist clamp up and remove the straps and blanket.



TEMPERATURE CONTROLLER PARTS LIST #102131

Included in the system and also sold separately.



Power cable



Temperature Controller





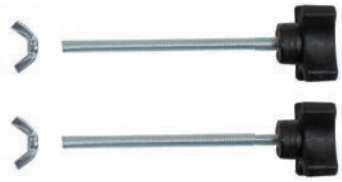
Bracket



Button head screws (2)
with square nuts (2)



Top bracket plate



Threaded rod screws with knobs (2)
with wingnuts (2)

INSTALLING THE TEMPERATURE CONTROLLER



Insert the two button head screws through the holes under the shelf of the bracket as shown. Add the square nuts to each screw, with the flat side of the nuts facing away from the bracket as shown. Do not tighten completely.



Set the two nuts into the track at the rear of the waist clamp. Slide the bracket down to align with the top of the waist clamp. Tighten using a 3/16" Allen wrench.



Place the Temperature Controller on the bracket with the outlets and red power button facing away from the bender. The feet on the controller will sit over the edges of the bracket, keeping it in place.



Place the top bracket plate on top of the controller. Insert the threaded rods through the holes in the top bracket plate, with the knobs on top. Place the threaded rods through the matching holes in the bracket and secure with the wingnuts.

When ready to bend, you will plug in the power cord, heat blanket, and thermocouple plug into the back of the Temperature Controller. Note the lower blade thermocouple plug is wider than the top blade.

Do not leave blanket and thermocouple plugged in when you are not bending.



SETTING THE TEMPERATURE

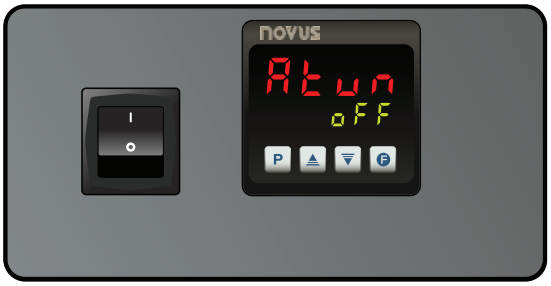
Set the temperature unit

The Temperature Controller can display either Celsius or Fahrenheit. Confirm the temperature unit before setting the bending temperature range. You will only need to change this once, the controller will remember your settings.

Plug in the power cord. Turn on the red switch at the back of the controller, then the black switch on the front. The two switches are a safety feature, both must be switched on for the controller to operate. The screen should display “r2.01 Std”.



Press and hold down the **P** button (Parameters). You will first see “Atun” displayed. Continue to hold the **P** button.



When you see the screen display “type”, release the **P** button.



Press and release the **P** button to toggle through the menu until you see “unit” displayed in red. The green text will read **°F** for Fahrenheit or **°C** for Celsius. Press the up or down arrow buttons to change to your desired unit. Once changed press and release **P** to continue through the menu.



Set the temperature range

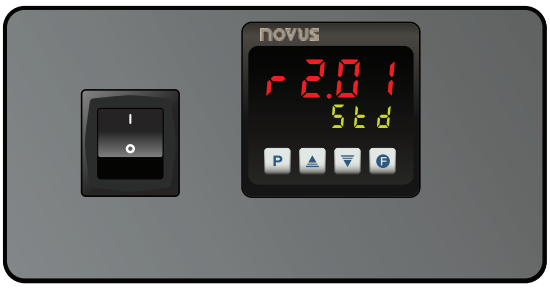
We recommend bending at 300 degrees, which is also the highest recommended setting for the Temperature Controller. Most woods bend well at this temperature, if you are bending softer or lighter colored woods test on scrap at a lower temperature.

CAUTION

DO NOT set the temperature with the Heating Blanket or thermocouple plugged in.

DO NOT turn on the Temperature Controller with the Heating Blanket plugged in unless it is in the sandwich and ready to bend. This can damage your Heating Blanket.

During bending, you can raise or lower the temperature of the blanket within your set range by using the up and down arrow buttons. We recommend setting the temperature range 10 - 20 to between your highest and lowest temperature. For example, if your maximum temperature is 300 degrees, your minimum temperature should be 280 - 290 degrees.



Turn on the controller. The screen should read “r2.01 Std”.

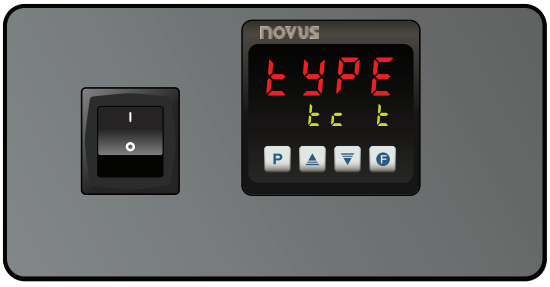
The screen will automatically switch to display the temperatures. The green number shows the current set temperature for the Heating Blanket, the red number is the current temperature measured by the thermocouple probe. The red number will appear as dashed lines when the thermocouple is not plugged in.



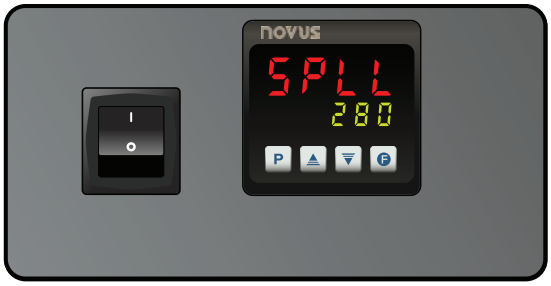
Press and hold down the **P** button. The screen will display “Atun” in red, continue holding.



Next the screen will display “type.” Release the **P** button.



To set the minimum temperature, press and release the **P** button until you see “SPLL” (Set Point Low Limit). Then use the up and down arrow buttons to set the desired minimum temperature.



To set the maximum temperature, press the **P** button again and you will see “SPHL” (Set Point High Limit). Use the up and down arrow buttons to set the desired maximum.

Maximum temperature: Do not exceed 300 degrees as you can scorch the wood and Bending Forms.

Press and release the **P** button once each time until you see the dashed red lines and green temperature number again.

The unit will remember the last temperature range set when turned back on. Always check the green temperature before plugging in the blanket.

When finished programming the Temperature Controller and after bending, always turn off both the front and rear power switches.



CAUTION

The Temperature Controller **DOES NOT** automatically shut off. You must turn it off with **both** front and rear power switches.

Whenever the heat is on and bending sides **DO NOT walk away**. It is easy to forget or get distracted.

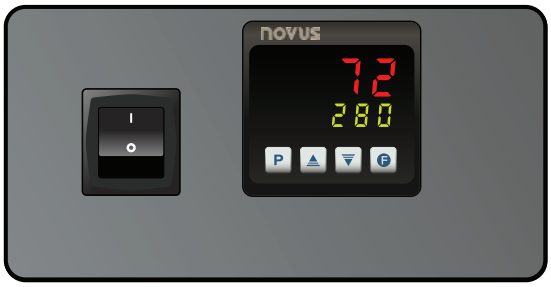
You can burn your sides **or worse**...

Overheating or "cooking" your sides can also case-harden them, making them brittle and more prone to cracking.

Set the temperature control timer

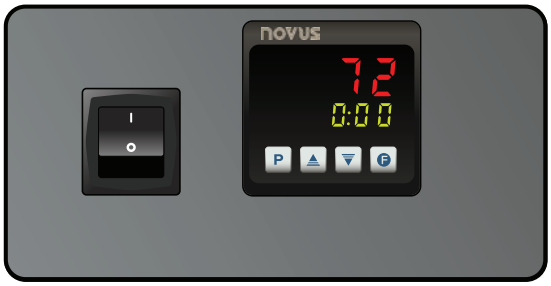
The timer in the Temperature Controller starts when your Heating Blanket reaches the low set temperature (SPLL). It will then count down from the timer's set time and shut the Heat Blanket off when it reaches zero.

After first turning on your controller with the thermocouple plugged in, you will see a red readout and a green readout.



After a few seconds, the red will show the thermocouple temperature reading, and the green will show the low temperature set point for your Heating Blanket.

Press the **P** button once, the red readout will remain on, while the green readout switches to a minutes-and-seconds timer.



Press the **P** button once more to change the red readout to t1 (for timer), and the green readout will show the preset 10:00 (ten minutes and zero seconds). Press the up and down arrow buttons to change the timer setting. We recommend NOT going above 15:00 (fifteen minutes and zero seconds).

At this time, load your "sandwich" (side covered in parchment paper, Heating Blanket, and steel straps) into the Side Bending Machine.

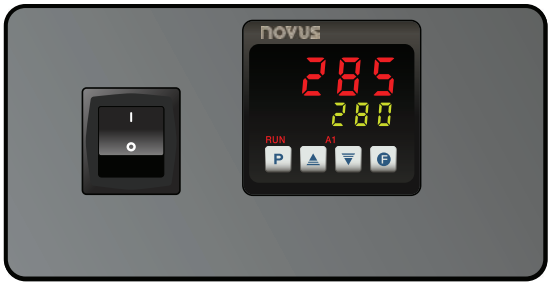


Press **P** again to change the red readout to “run” and the green to “no”. At this point, there is no power to the Heating Blanket. Press the “down” arrow once to change the green readout to “yes”. In the bottom left corner, in smaller letters, you’ll see the words “RUN”. This turns on the Heating Blanket and will start the timer countdown when it reaches the low set point.



Press **P** again to return the red readout to the current temperature, and the green readout to the low set temperature.

Finally, press **P** once again to see the current temperature of the Heating Blanket on the red readout. When the set temperature is reached, “A1” will light up red in the bottom left center of the controller. This tells you the timer circuit has started.



The green readout will now show the timer counting down. (It will need to fully cycle before you can reset.) When the timer reaches 00:00, the Heating Blanket turns off, and the sides and blanket will start to cool down.



CAUTION

Manually turn off **both** power switches and **unplug** the Heating Blanket when the timer reaches zero and the bend is complete.

This is an extra safety measure while the side and machine cool to room temperature. **Never** leave the immediate area of the Side Bending Machine while the Heating Blanket is on!



PART 2: HOW TO BEND SIDES

GETTING STARTED

Consistently bending sides takes patience and a lot of practice, and is learned through experience and feel. Every luthier has their own unique method, these instructions are a guideline for bending non-figured mahogany, rosewood, and maple sides. Every species of wood has its own challenges, and even experienced guitar builders will occasionally break, crack, or scorch their sides.

Some woods bend easier and more quickly than others. You may need to move more slowly to prevent cracking some woods. We suggest doing several practice runs on an easy-to-bend wood, like walnut, to become comfortable with the operation.

Required tools and supplies

- Heat-resistant gloves
- Super-Soft 2 Veneer Softener or spray bottle with distilled water
- Side-wrapping material such as craft paper, parchment paper, or aluminum foil
- Chalk
- Sharpie

Tips from the Experts

There are MANY ways to bend a guitar side, and every builder does it a bit differently. Here are some tips from different builders on how they bend:

"I've found wrapping the wood in craft paper creates more steam and gives me a good, even bend."

"Some woods like koa and maple can react to being heated in foil, it's a good idea to test on scrap of the same species."

"Some woods require sanding the cutaway portion thinner, others don't."

"I've had good results from starting my waist bend at around 280 degrees, and finishing the whole bend when the temperature reaches 300 degrees."

"Some woods need to cook longer after they are bent to hold the shape, others are ready to go once the bend is complete and they've cooled down."

PREPARING THE SIDES

Prepare your guitar sides by profiling the side that attaches to the back of the guitar. Thickness sand the sides to 0.075" to 0.085".

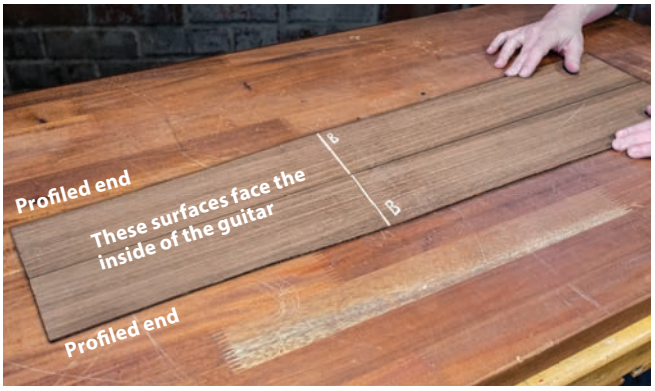
Bookmatch your sides so that the flat edges meet and the profiled edges face out. The flat edges attach to the guitar's top, the profiled edges attach to the guitar's back. This will orient the sides so that the interior surface of the guitar is facing up, and the outside surface of your sides are against the bench. Be sure not to accidentally flip the bookmatch.

Mark the waist location on both guitar sides. Also write the letter "B" (for "Back") on the profiled edge to indicate this edge attaches to the guitar's back. This will help you orient the sides throughout the bending process.

To help visualize how to position the side when bending, do several dry runs inserting the side into the bender. Eventually sides will be hidden in layers of paper, the Heating Blanket, and straps called "the sandwich".

Once your sides are wrapped and placed in the sandwich, the waist and back markings will not be visible. It's extremely important to transfer the markings on your side to the wrapping as described later.

Remember, you will always be bending with the interior surface of the guitar side facing down, toward the forms. Follow the guide on the following page to better understand how to orient the sides throughout the bending process.



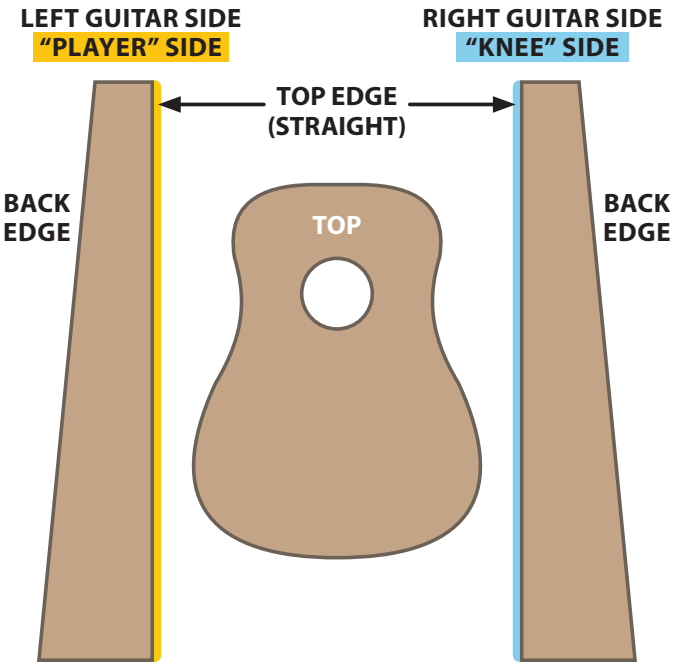


Side orientation in the bender

Maintaining the correct orientation of your sides in the bender can be one of the trickiest parts—even the most experienced builders will inevitably bend a side in the wrong direction sooner or later (it's true, we've polled many builders!). It's especially easy to lose track of the orientation after the sides are hidden inside a sandwich.

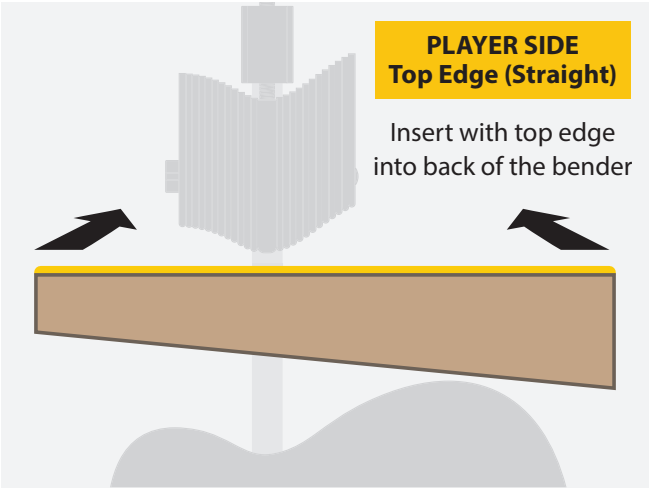
To help with this, we've created a guide with tips to keep your sides oriented correctly throughout the bending process:

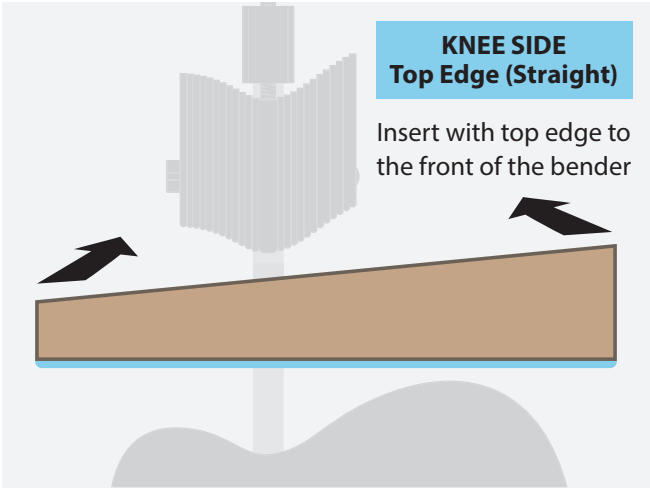
- Always position the narrow **NECK END** to the left of your workspace/bender.
- Make a mark with chalk on the surface of the side that will be the **INTERIOR** of the guitar at the middle of the waist. Note the **INTERIOR** surfaces are facing down in the illustration to the right, so the waist and B marks aren't visible.



Envision the front of a guitar, there's a left and right side.

- Left = **PLAYER** side, it faces up to the player when in playing position.
- Right = **KNEE** side, it faces down to the player's knee.
- The long edge that will join to the guitar **TOP** is straight, they are highlighted in yellow and blue here.
- The opposite edge will join to the guitar **BACK** is tapered (shown with an exaggerated taper for visibility).





When loading the sandwich into the bender:

- The **INTERIOR** surface is always facing down.
- Narrow **NECK END** is always to the left.
- When working the **PLAYER** side, the **Top Edge (Straight)** is inserted toward the back of the bender
- When working the **KNEE** side, the long **Top Edge (Straight)** is inserted so that the top edge is towards the front of the bender.

PREPARING THE SANDWICH

Wear gloves to protect your hands from the sharp sides of the straps. Lay one strap on a flat surface. This will be referred to as the bottom strap.

Prepare a wrapping that is the same length and twice the width of your guitar side. Lay the wrapping on top of the bottom strap.

Transfer the marks from the bottom of your side to the top of your wrapping so they are visible when positioning the sandwich in the bender. Transfer the marks using a Sharpie marker.



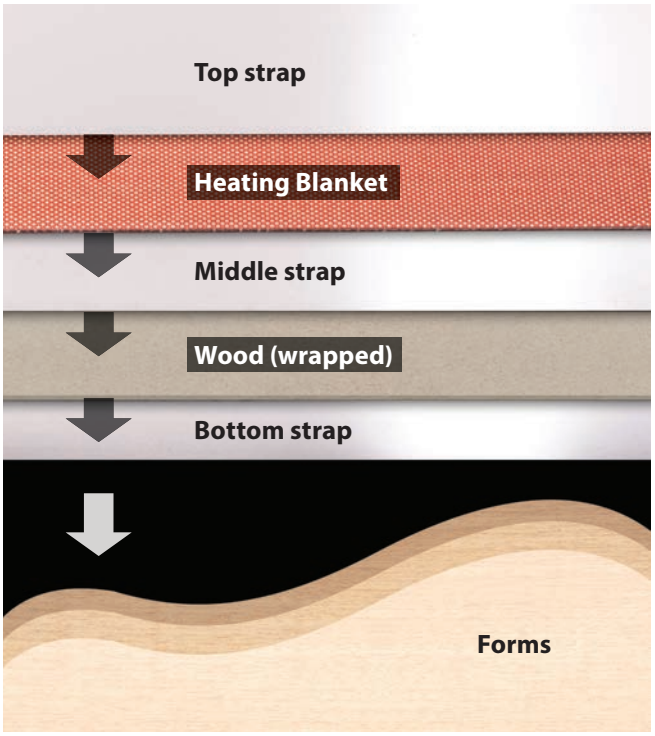
Lightly spritz both surfaces of the guitar side and the interior of the wrapping with distilled water or Super-Soft 2 Veneer Softener. Lay the guitar side back into the wrapping with your waist mark and "B" facing down (toward the floor) and the tapered neck end of the guitar side pointing left toward the upper bout.



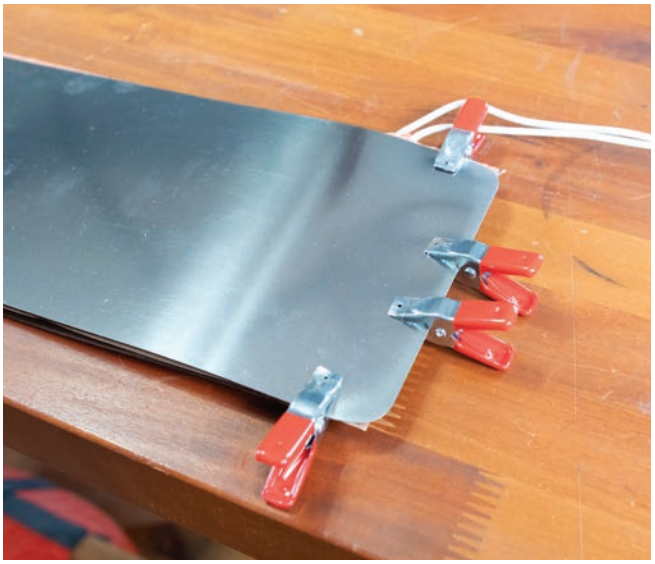
Fold the wrapping over the guitar side so it's completely encased. Make sure the marks on your wrapping and on your side are still aligned. Lay the wrapped guitar side on top of the bottom strap.



Lay the middle strap on top of the wrapped guitar side, followed by the Heating Blanket. Orient the Heating Blanket so that its cord faces the back of the bender. Finally, place the top strap on top of the Heating Blanket.

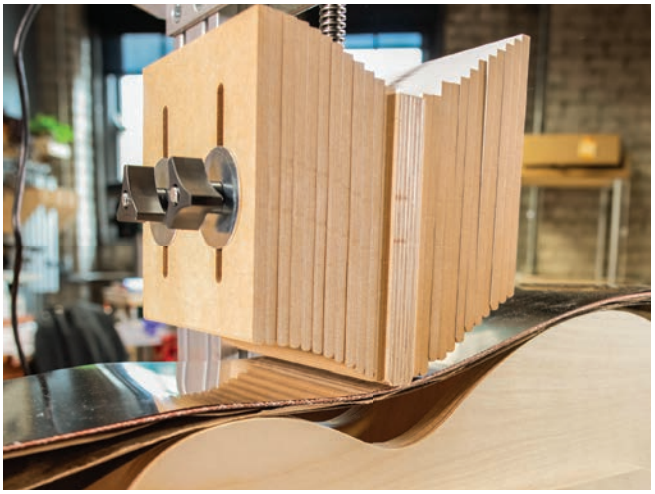


Clamp the sandwich together at the lower bout end where the Heating Blanket cord attaches.



Set up the bender

Place the sandwich on top of the Bending Forms. Lower the waist clamp down until there is just a little tension on the sandwich holding it in place.



Align the sandwich so that the waist mark you transferred onto your wrapping is under the center of the waist clamp. Once aligned, make sure your side and wrapping are completely encased by the bending straps.



Make sure the upper bout pressure bar is positioned between the back of the bender and the waist clamp as shown. Once the waist clamp is lowered you will not be able to reposition it.



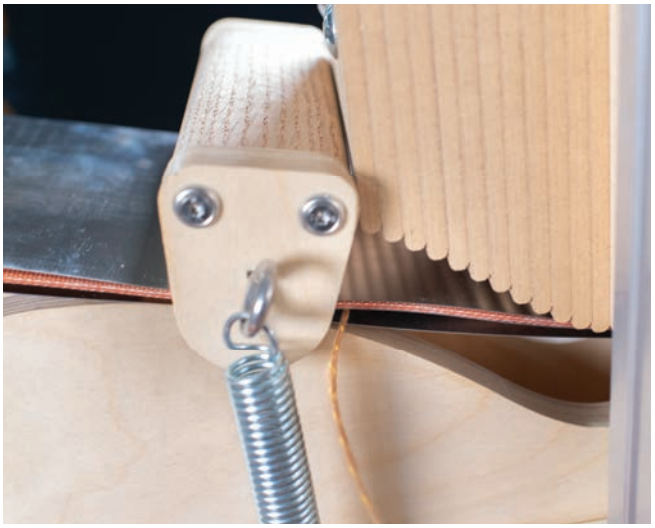
Before installing the thermocouple probe, trim back the insulation to expose a total of 1-1/2" of bare lead. To prevent the probe from being crushed by or interfering with the pressure bar, install it from the back side, next to the lower-bout end of the contour plates, as pictured. Make sure it is not pinched under the contour plates. Insert the thermocouple probe into the sandwich between the wrapped wood and the middle strap approximately 2-1/4" deep.



Install the lower bout pressure bar over the sandwich. It should ride over the edges of the sandwich and Bending Forms and rest against the waist contour plates. Take care to install the spring hooks onto the spring mounts, and not the ring handles.

PLEASE NOTE: The straps can move when installing the pressure bars; use care to keep them centered on the Bending Forms to prevent the edges from crimping.

The installed lower bout pressure bar and thermocouple probe should now look as pictured. Reposition the thermocouple probe if necessary.



Repeat these steps with the upper bout pressure bar, resting it against the side of the waist contour plates. Plug in and turn on the Temperature Controller. Check that the temperture range is set as desired. Once confirmed, turn off the Temperature Controller. **DO NOT** plug in the blanket until you are ready to bend.

Plug in the Heating Blanket. Make sure that both the Heating Blanket and thermocouple cords are clear of the path of the waist clamp and the lower bout pressure bar's path.



BENDING PROCEDURE

The entire bending process should take 10-15 minutes. Any longer than that risks scorching the wood. Wear heat-resistant gloves throughout the entire bending process.

Turn on the Temperature Controller. Once the red number reaches your desired temperature, you can slowly crank the waist clamp down about half way into the waist.

Wait one minute, then lower the waist clamp slowly until the sandwich has fully settled into the waist. Now slowly crank the waist clamp back up a few turns out of the waist. This pre-bending will help prevent the sides from slipping while bending the upper and lower bout.



Slowly pull the lower bout pressure bar down to start bending the lower bout. Take your time and pull it down until it's right at the end of the form. You may need to remove the mini clamps to completely lower the pressure bar. This bend should take 2-3 minutes.



Repeat the steps for the upper bout. It is a tighter bend, so take your time. It should also take 2-3 minutes.

Now lower the waist clamp until it is completely clamped into the waist.



Once the waist clamp is tightened, turn off the power to the controller. Let the wood set and cool for 10-15 minutes before removing the side.

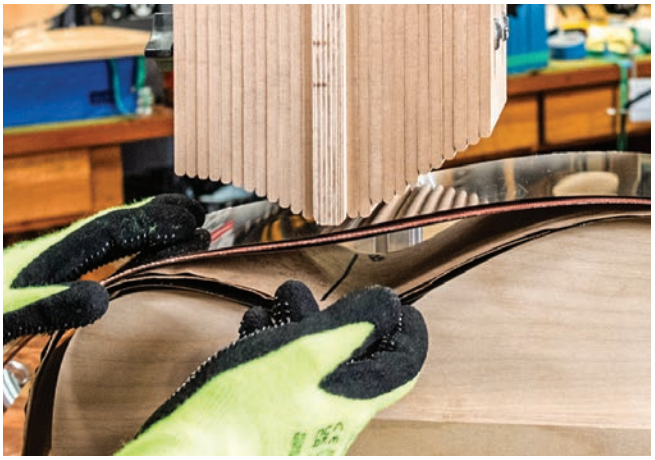
After the sandwich is completely cool, you must take the tension off the pressure bars to remove the side. Keeping one hand on the sandwich to hold it steady, slowly slide the lower and upper bout pressure bars up until they rest against the waist contour plates.



Once you get near the contour plates, use two hands to prevent the pressure bars from slamming into the plates.

When both pressure bars are resting against the waist contour plates, carefully unhook and move them to the back of the base. You may need to raise the waist clamp slightly to remove the upper bout pressure bar.

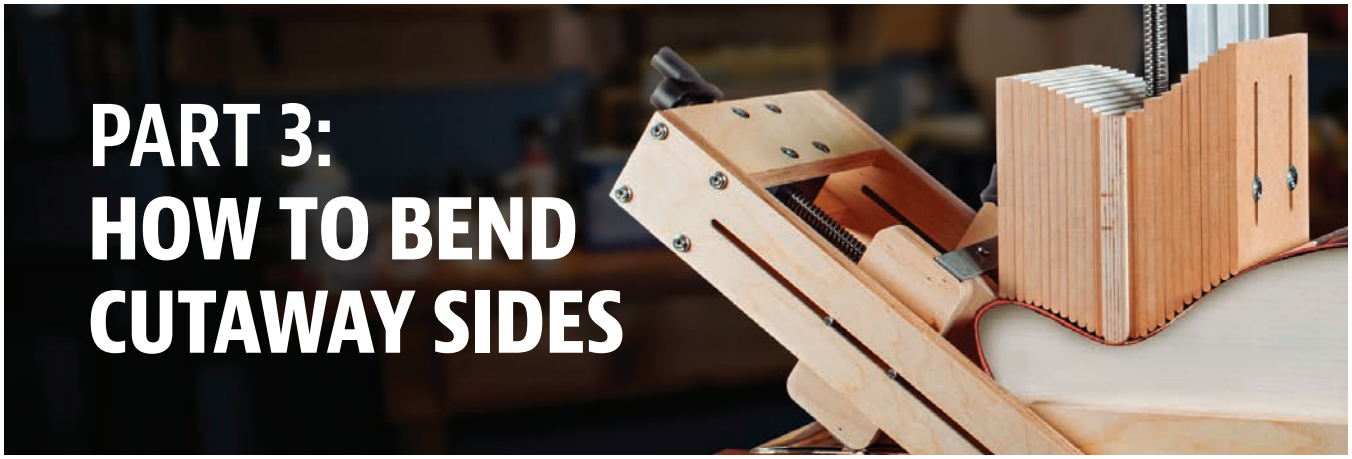
Crank the waist clamp up and remove the sandwich and bent side.



You now have a beautifully bent side!



PART 3: HOW TO BEND CUTAWAY SIDES



PREPARATION AND SETUP

You should be completely comfortable with all aspects of the bending procedure before attempting to bend a cutaway side.

Bending a cutaway side can be more challenging, as the tighter curve can be more prone to cracking and faceting. There are additional steps to preparing the side and different bending procedures. As always, practice on scrap and an easy-to-bend wood, like walnut, to get comfortable with the process.

Installing the Cutaway Ram

The Cutaway Ram comes assembled. You will install the cutaway mates that are included with the Bending Forms before use.



Cutaway Ram #6221

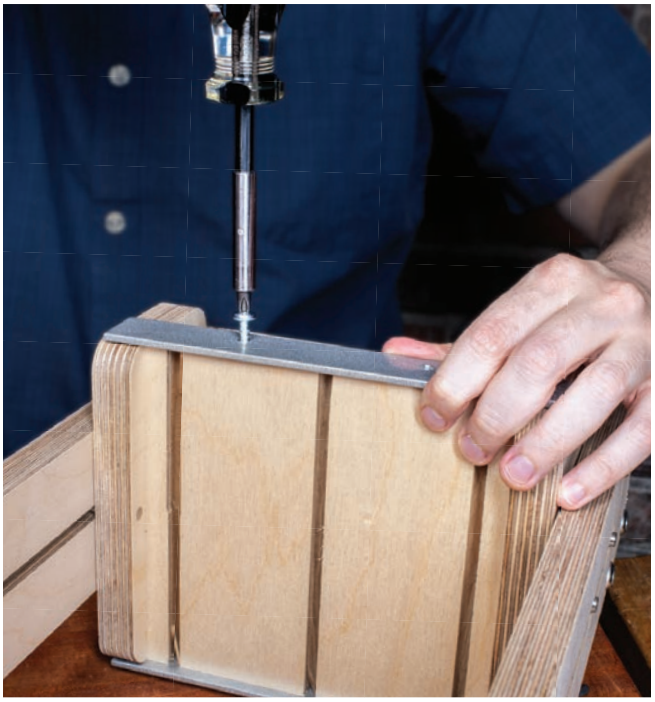
The Cutaway Ram will hook to the protruding ends of the bending form alignment rod. The hooks on the Cutaway Ram will face down when installed. When raised, the front of the Cutaway Ram will face the waist clamp, the back will face the upper bout.



Mount the cutaway mates

Before installing the cutaway mates, orient them to the Bending Forms. They mate into the cutaway on the Bending Form when clamped.

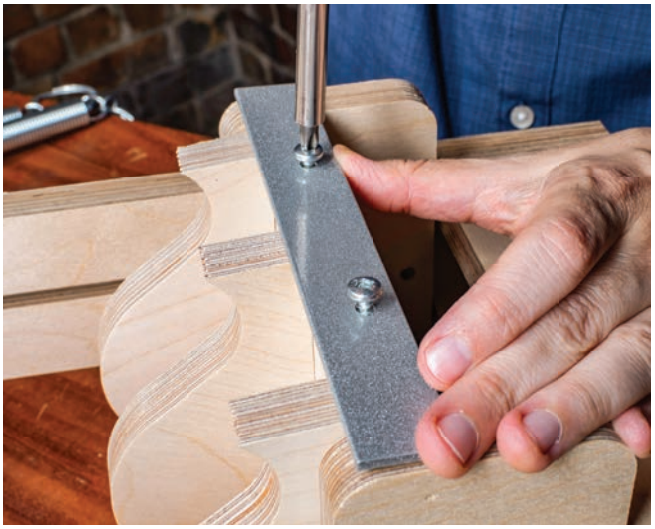




Unscrew the front retainer plate on the Cutaway Ram to expose the screw slots. Slide the cutaway mates into the slots, making sure they match the cutaway in the Bending Form. If the cutaway mates are difficult to slide in, adjust the screws on their undersides so they slide in snuggly.



Reinstall the retainer plate. Note the holes in the plate are offset. Make sure that the plate is oriented to fully contact the mates when reinstalled.



Install and test the Cutaway Ram

First, install the Bending Forms and set the waist.

With the Cutaway Ram's hooks facing downward, attach it to the protruding ends of the bending form alignment rod.

Test that the Cutaway Ram moves freely on the rod. It should be able to move upward enough to nearly contact the waist contour plates.



Use the crank on the Cutaway Ram to lower the cutaway mates completely into the cutaway of the Bending Forms.

Remove the Cutaway Ram by raising the crank all the way up. Then lower the Cutaway Ram towards the floor to unhook it from the base.



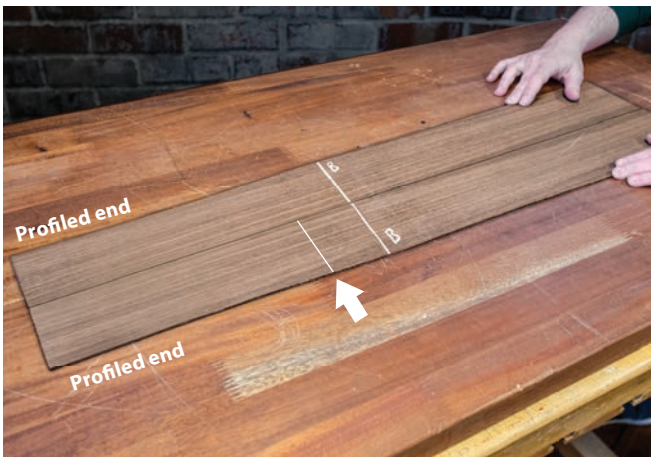
Prepare the sides

Some builders sand the interior surface of the cutaway thinner to prevent cracking the side during the bend. This additional sanding may not be necessary for your sides. Practice on scrap to determine if your sides require this step

Make an additional mark on the cutaway side approximately 3-1/2" towards the neck from the waist mark you made previously. This mark will also be on the interior of the guitar.

Sand the interior surface of the guitar side from the neck end to this mark, until that area is between 0.055" and 0.060" in thickness.

Complete your sandwich and setup, you will be installing the Cutaway Ram during the bend and not using the upper bout pressure bar.



BENDING PROCEDURE

The entire bending process should take 10-15 minutes. Any longer and you risk scorching the wood. With your bender and sandwich completely set up, turn on the Temperature Controller. Once the red number reaches your desired temperature slowly crank the waist clamp down about half way into the waist.

Wait one minute, then lower the waist clamp slowly until the sandwich has fully settled into the waist. Now slowly crank the waist clamp back up a few turns out of the waist. This pre-bending will help prevent the sides from slipping while bending the lower bout and cutaway.

Slowly pull the lower bout pressure bar down to start bending the lower bout. Take your time and pull it down until it's right at the end of the form. You may need to remove the mini clamps to completely lower the pressure bar. This bend should take 2-3 minutes.

Now lower the waist clamp until it is completely clamped into the waist.



Install the Cutaway Ram

With the hooks facing downward, install the Cutaway Ram over the protruding ends of the bending forms alignment rod.

Raise the Cutaway Ram until it nearly touches the waist contour plates. Starting at this high angle will gradually shape the cutaway and prevent cracking or faceting the wood.



Bend the cutaway

Start slowly cranking the cutaway mates down. As you continue to lower the mates they will slide down the sandwich, creating the cutaway bend. The Cutaway Ram will move into place as you clamp the cutaway mates and Bending Forms together. It will be locked into place once the forms are fully mated. This should take 2-3 minutes depending on the wood and shape of your cutaway.



Once the Cutaway Ram is fully mated, turn off the Temperature Controller. Let the wood set and cool for 10-15 minutes before removing the side.

After the sandwich is completely cool, you must take the tension off the pressure bar to remove the side. Keeping one hand on the sandwich to hold it steady, slowly slide the lower bout pressure bar up until it rests against the waist contour plates.

Once you get near the contour plates use two hands to prevent the pressure bar from slamming into the plates.

Remove the Cutaway Ram by raising the crank all the way up. Then lower the Cutaway Ram towards the floor to unhook it from the base.



Crank the waist clamp up and remove the sandwich and bent side.

You now have a beautifully bent cutaway side!





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