A Step-by-Step Guide to Reedmaking

If starting from tube cane:

If you purchase tube cane, you must process it to the pre-gouged state immediately in order to insure that there are no bug-infested pieces (one piece infested with bugs can contaminate your entire supply of tubes). Process the tubes using these procedures:

1. Using a 4-section cane splitter, split the tube into 4 pieces; remember to wear a heavy glove on the hand that holds the cane to avoid slicing your thumb with the splitter.

2. Soak the cane for approximately 2 - 3 weeks; change the water daily as elements in the cane will leach out. The cane will be ready to take out of the water when it is fairly clear after soaking.

3. Pre-gouge the cane wet using a two-blade pre-gouger; this machine will narrow the cane with a straight blade and gouge the cane with a curved blade. The pre-gouger removes most of the excess interior thickness so that the gouging machine has minimal material to remove (thus, keeping the gouger's blade sharper for a longer time).

4. After pre-gouging, lay the cane flat to dry; never stack the cane as mold will develop. The cane will need to dry for at least one week.

5. When you are absolutely sure that the cane is dry, place it in a sealed container for storage; label the container with the name of the cane's source and year of purchase.

6. The next step is to gouge the cane.

If starting from pre-gouged cane:

The next step is to gouge the cane using a bassoon cane gouger.

1. Soak the pre-gouged cane until it sinks to the bottom of your container; this will take several hours.

2. Using the guillotine on the gouger, cut the cane to the correct length to fit in the gouger bed.

3. Place oil at the points of friction on the gouger each time you use it.

4. Place the cane in the gouger bed and start gouging. When the gouger blade has stopped cutting, move the carriage up and away from the cane, turn the cane 180°, and continue gouging until the blade has stopped cutting (after flipping the cane 180°, you should only have to move the gouger blade 2-3 times)

5. Remove cane from the gouger bed.

6. The next step is to profile the cane.

If starting from gouged cane:

The next step is to profile the cane using the bassoon cane profiler. The directions below are specific for a Butterfield Profiler.

1. Place oil at the points of friction on the profiler each time you use it.

2. Measure the length of the cane to find the center. Mark a line across the width of the cane at the center point (the mark should be placed on the bark side).

3. Move the profiler carriage up and away, remove the profiler cam, loosen the cam clamps, and place the cane on the cam. Line up the center line of the cane with the center line of the cam; also place the cane equidistant between the two outside lines of the cam (the lines on each side running the length of the cam).

4. Return the cam to the profiler, attach the silver connector piece, move the carriage back over the cane, and begin profiling. In the process of profiling, you will turn the cam 180° several times; clean the cane from the profiler blade as you turn the cam each time.

5. When the blade will no longer remove cane, lift it from the profiler but don't loosen the clamps; place the black metal reed outline piece on top of the cane and using a sharp pencil, trace the reed shape onto the cane. Also mark the center of the metal reed outline piece onto the cane (mark it on both sides of the cane).

6. Loosen the cam clamps and remove the cane.

7. The next step is to shape the cane.

If starting from gouged and profiled cane:

The next step is to shape the cane using the a flat bassoon shaper.

1. Loosen the screws on the shaper at the same rate to open the shaper halves.

2. Insert the soaked cane between the shaper halves and tighten the screws at the same rate. If a shaper pin (located at each end of the shaper) start to jam on one side, stop immediately and loosen the screws until the shaper is no longer jammed. Continue tightening the screws at the same rate.

3. When the shaper is tightened against the cane, back off the screws slightly so you can line up the center line of the cane with the indented "v" of the shaper. Also, using your thumbs and forefingers, slightly adjust the cane in the shaper so that the pencil line on the cane conforms to the shaper outline. Retighten the shaper.

4. Use an X-Acto knife with a sharp blade. Starting on one side of the cane, cut a thin piece of excess cane along the entire length of the cane; repeat this process on the other side of the cane.

5. When shaping, trim one quadrant side at a time. The movement of the knife is to cut one way, then the opposite way on a quadrant, both times ending at the narrowest part of the shaper. First start shaping from the butt end of the reed; cut only to the narrowest part of the shaper and stop; now starting at the "v" area of the shaper (the middle of the shaper), cut towards the butt of the reed, stopping at the narrowest part of the shaper. Again, when you shape, always stop at the narrowest part of the shaper or the knife will travel too far and cut the cane too narrow.

6. Repeat step 5 until one quadrant is shaped. Continue the same process on the remaining 3 quadrants of the cane.

7. Finally, make a downward cut at the "v" area of the shaper on both sides.

8. Loosen the shaper screws at the same rate and remove the shaped cane. If a shaper pin start to jam on one side, stop immediately and loosen the screws until the pin is no longer jammed.

9. The next step is to construct the blank.

If starting from gouged, profiled, and shaped cane:

The next step is to construct the reed blank. It is helpful to construct several blanks at a time.

1. Soak 10 pieces of cane for 2 hours in warm water (you do not have to change the water to keep it warm).

2. Place a 6" metal ruler on the reed at the point where the bark ends and inner cane starts (that is, the start of the blade area) and measure back to the butt end; using a sharp pencil, make a mark at 1-1/8".

3. At this mark, draw a line across the cane using a 6" metal ruler; repeat steps 2 and 3 for the opposite end of the cane.

4. Place the cane on an easel or wooden dowel and using your reed knife, score the pencil line a few times. You are trying to cut through the hard outer surface of the cane. Next, continue cutting the cane on this line by pressing down hard to cut all the way through. Repeat this step on the opposite end of the cane.

5. Turn the cane over and sand the inner side with a 2" x 1-3/4" piece of #600 wet/dry sandpaper. Be careful to not catch the edge of the sandpaper in the "v" cuts at the tip of the reed. Change to a new piece of sandpaper after sanding 10 pieces of cane.

6. Score the cane. You will now be cutting lines in the bark that run from the 1st wire area to the butt end of the reed. Using an X-ACTO knife placed in the center of cane (at the location of the 1st wire), cut halfway through the cane all the way to the butt end. Continue this process for the entire width of the reed tube. The total number of score lines doesn't matter however, make sure you have at least 8 score lines in the bark. Be careful to not cut all the way through the cane. Repeat this scoring process on the other end of the cane.

7. Using your reed knife, fold the cane at the reed blade center and place a temporary wire at the location of the 1st wire. Use a 3-1/4" piece of #24 soft-brass wire. Twist wire ends 1/2 turn with your fingers, then use pliers and turn another 1/2 turn only (when you tighten wires, you first pull on the wire ends, then twist to take up the slack); the wire will slip around during this process, so now move it into the 1st wire position.

8. Soak a 4-1/2' length of string in water for a few seconds; squeeze the string as it soaks in the water. Wrap it around the blank starting at the butt of the reed. Keep wrapping (tight wraps, like a spool of wire) until you reach a point 1/2-way on the blade; at that point, start a second layer of wrapping, continuing back to the butt. Each time as you reach the temporary wire, simply wrap around it.

9. Rub a piece of paraffin wax over your forming mandrel.

10. Using pliers, slightly squeeze the temporary wire open a tiny bit (this helps to prepare the area for the round forming mandrel and avoid cracks running into the blade when you insert the forming mandrel); now open the butt end with the pliers and insert the forming mandrel. Place the mandrel's handle against your waist and press the reed on the mandrel with your hands. The reed will be at the correct place on the forming mandrel when the 2 halves of the blank start to open at the very end. You may have to slightly push the string aside in this area so you can see the two halves of the blank.

    a. It is useful to have a line marked on the forming mandrel so you will know how far to push the reed. To mark your mandrel:

        1. Form the tube as described above in step 10, stopping when the two halves of the reed start to open.

        2. Place a piece of masking tape on the forming mandrel at the butt end.

        3. Remove the reed and, using your pillar (flat) file turned at a 45° angle, carefully (accurately) file a mark at several places around the mandrel at the top edge of the tape.

11. Slightly tighten the temporary wire; don't tighten it so much that the cane will be dented. Remember that when you tighten a wire, you pull first, then twist to take up the slack.

12. Place the reed on a drying board forming tip; make sure that it is the longer forming tip and not the shorter holding tip. Let it dry 48 hours.

    a. The forming tip is long enough to go through the tube of the reed and act as a form that the cane dries around.

Dry Beveling:

Beveling is a process where cane is removed from the reed tube in a graduated amount, from butt end to the 2nd wire. This helps to create a natural tip opening one that is adequate enough without having to excessively open the 1st wire by way of the fulcrum that is created at the 2nd wire area when cane is removed. If the 1st wire is squeezed too much in order to open the reed tip, this will create too much resistance in the reed.

13. When the blank is dry, remove the string and cut off and discard the temporary wire.

14. To bevel the reed:

    a. Place a piece of #220 wet/dry sandpaper on the edge of a table (make sure that it is on the exact edge of the table).

    b. Carefully open the reed to a 90° angle.

    c. Place half of the blank on this sandpaper. Your index finger should be at the butt and slant towards you at a 45° angle; your thumb should be at the tip of the blank. The pressure of your fingertip at the butt along with less pressure as your finger gradually slants back will create a graduated bevel.

        1. Your index finger presses down on the butt end while sanding. Your thumb, placed at the tip of the reed, acts as a pushing device while sanding. The sanding motion is going away from you then returning back towards you. One "away and return" motion counts as 1 sanding motion.

d. Sand back and forth approximately 22 times. Sand up to the 2nd wire area. The reed will be correctly beveled if the tip starts to open when you close the butt with your thumb and forefinger.

1. Remember to keep the blank absolutely flat as you sand; otherwise, you will sand only a small portion of the tube.

e. If the tip doesn't open enough, check your sanding technique to make sure that the forefinger is at a 45° angle and that you are applying a decreasing amount of pressure on the reed from but to 2nd wire area. Make sure that you sanding only to the 2nd wire area before reversing the sanding direction.

f. Repeat steps 14a-d for the other side of the blank.

15. Add the final wires:

a. Rub wax on your forming mandrel and place the beveled blank on the mandrel; using 3-1/4" lengths of #21 soft-brass wire, place wires on the reed tube in this order: 2nd wire, 3rd wire, and 1st wire (using this order avoids cracks running into the blade area).

b. When placing wires, wrap it around the reed 2 times then twist 1/2-turn with your fingers; use pliers to lightly snug the wire (pulling first, then twisting to take up some slack); the 1st and 2nd wires will be slightly loose on the reed at this point (allowing their positions to be fine-tuned later).

c. The 3rd wire can be fully tightened near the butt end of the reed (where the traditional Turk's head is placed); cut the twists very short, leaving 2 twists.

d. Now, cut the 1st and 2nd wire twists to the proper length for a finished reed; fold over the wire twists.

1. Traditionally (and practically), the 1st wire twist is bent towards the butt end of the reed; the 2nd wire twist is bent towards the tip of the reed.

e. Fine-tune the placement of the 1st and 2nd wire:

1. Place a 6" metal ruler at the TOP of the 1st wire and measure towards the tip of the reed; the top of the 1st wire must be between 1/16" and 3/32" inch from the start of the bark (the beginning of the blade area). Tighten this wire as needed to make sure that it doesn't slip (but don't dent the cane by excessive tightening!).

2. The placement of the 1st and 2nd wires is critical for a successful reed. Place the ruler in the split of the 1st wire, measure back to the split of the 2nd wire; the 2nd wire should be exactly 5/16" from the 1st wire when measured split to split. Fine-tune the placement of the 2nd wire by moving it with your fingernails (don't move the 1st wire at this point). Tighten this wire as needed to make sure that it doesn't slip (but don't dent the cane by excessive tightening!).

3. The 3rd wire's placement is not as critical and should be placed close to the butt end of the reed.

16. Seal the reed tube:

a. You may use heat-shrink tubing, hot glue, Duco cement, or a combination of string wrap and Duco cement to seal the reed tube.

1. When using heat-shrink tubing, use 3/8"-diameter tubing, available in 12" lengths from desertrosereeds.com. Cut a piece long enough to extend just below the 2nd wire to just above the butt end of the reed. Slip the tubing over this area and hold a match to it while you rotate the reed. The heat-shrink tubing will immediately adhere to the cane with a tight seal.

2. When using hot glue, simply apply with a glue gun to the area from just below the 2nd wire to just above the butt end of the reed. Immediately dip the reed tube in water for a few seconds and then mold the glue with your fingers as you wish to create a smoother surface.

3. When using Duco cement, make sure that your work area is well ventilated (open a window). Place several sheets of paper towel on a work desk, and apply a liberal amount of cement to the area just below the 2nd wire to just above the butt end of the reed. The cement will drip off of the reed. Rotate the reed as you apply the cement. When this tube area is fully covered, keep rotating the reed as you blow against the cement. The cement needs to set up for a minute before it is ready to be placed on your drying board mandrel. You may need to also hold the reed with the tip pointing up, then down to evenly distribute the cement. One coat is sufficient to seal the reed tube but for convenience purposes, you may want to apply a 2nd and 3rd coat of cement only at the Turk's head area to build up the cement over the 3rd wire. This keeps the wire from gouging your fingers as you put the reed on the bocal.

4. When using the traditional string wrap, apply the string first, then coat it with one coat of Duco cement. This will seal the reed tube properly.

17. Ream the reed (a dry reed) with your reamer. A convenient aid for your reamer is a drill stop, a circular metal piece that fits over the blades of the reamer. You can set it to a particular place with a set screw. Then when you ream a reed, it will stop against the drill stop making sure that you don't ream too far. Drill stops are inexpensive and can be found online at Ebay and other locations. The reed should fit on your bocal 3/8".

18. Cut the tip:

    a. Place a 6" metal ruler at the 1st wire and measure towards the tip, making a pencil mark at 1-1/8". Draw a line across the width of the reed using the ruler and with your reed knife, cut the tip at this line. The blade length will probably be slightly too long for a finished reed (A=440), but you need to first trim the blade and determine how the reed is sounding before determining the final length of the blade.

19. Soak the reed for 4 minutes; put it on a reed storage board (a board fitted with blunt nails or holding mandrels) for 3 days.

20. After 3 days, ream the reed (dry) and repeat step 19, letting it sit for an additional 3 days.

21. After 3 days, ream the reed (dry) and repeat step 19, letting it sit for an additional 3 days.

22. After 3 days, place it back on your reed storage board. Store the reed for 3 months; it needs this amount of time to adjust to temperature and humidity changes, stabilizing in the process. Remember that you have taken a straight piece of cane and radically changed it by the process of forming, soaking, and drying; you will get better results by letting the reed sit for a period of time.

23. The next step is to trim the blade.

Trimming the Blank:

After letting your blank sit for 3 months, you are ready to trim the blade into a finished reed. I strongly recommend practicing the steps below on an old reed so that if mistakes are made they won't occur on a reed that you have invested a considerable amount of time in construction. When mistakes do happen (and they will), determine why they happened and how you can improve your technique. Make a notation in a reed notebook so that you can review these notes the next time you trim a reed blank.

To trim the blade, you will need your instrument, high-intensity reed light, dial indicator, holding mandrel, plastic plaque, reed knife, pillar file, file cleaner, #600 wet/dry sandpaper, reed soaking cup, and a sharp pencil.

1. Soak the reed in water for 3-4 minutes.

2. Cut in the shoulder step:

    a. Using your reed knife, score a line above the 1st wire at the point where the bark stops and the blade begins.

    b. Place your knife on the reed blade approximately 3/8" - 5/16" away (towards the tip of the reed) from this scored line. Your knife should be slightly raised above parallel to the cane in order to cut thin chips out of the blade; move your knife towards the scored shoulder line.

    c. If the cane chips do not readily come off, re-score your line.

d. The profile of the shoulder area the area just in front of this scored line should be slightly above a parallel plane. If it is parallel or below parallel, you will be cutting out much of the strength of the reed and notes in the 2nd and 3rd octaves will not respond. Be very careful when cutting in the shoulder step.

e. You can use your pillar (flat) file to lightly file uneven knife marks at the shoulder area (however, don't file away too much cane from this area).

f. Repeat steps 2a-e on the other blade.

3. Using a sharp pencil, draw a center line on the blade from shoulder to tip; this will be used as a guide when filing. There are 4 quadrants on the reed blades. When filing, if the line disappears, this will indicate that you are filing too much into an adjacent quadrant. You should then redraw the line, reduce the angle of your file where this line disappears, and continue filing.

4. File both quadrants on one blade. You should have your file cleaner (wire brush) at hand. When you are filing a quadrant on a new reed blank, you can make 6-7 passes. Count the number of passes and repeat this number on the other 3 quadrants. Clean your file with the file cleaner after filing each quadrant. Remember to turn your file over and use the clean side when one side fills with cane residue. You will probably have to file the blade 2 or 3 times before moving to the next step.

5. File the quadrants again but this time concentrate only on the front 1/3 of the reed. File in the same way as step 4 above. Be very careful at the reed tip and edges as these are very thin and can tear easily.

6. Examine the reed under a light, If there are any dark areas that do not appear evenly in all quadrants, the blade is unbalanced. Use a file to lighten these specific dark areas so that all quadrants look alike (balanced).

7. Check the edges of the blades. Each edge is a very tall and thin triangle. Make sure that this triangle is evenly sloped from shoulder area to tip. Many times, the edge of the shoulder is too thick. In this case, use your pillar (flat) file and file just the edge of the blade. Make sure that all 4 edges of the reed blades are symmetrical. You are trying to create 2 blades that are balanced with each other.

8. Cut in the valleys:

    a. A valley is an area approximately 1/16" - 3/32" wide, halfway between the center line and the blade edge. There are 2 valleys on each reed blade, one to the left and one to the right of the center line. Using your reed knife, trim in a straight line, from the shoulder to the tip. You will need to do this 3 times.

9. Trim the reed tip, as needed, to produce a well-defined half-moon shape. Use your knife for this step.

10. Dip the reed in water and then see how it responds by playing a few notes on your instrument. With practice, you will be able to determine what step in the trimming process that you need to repeat.

    a. You may need to slightly open the 1st wire. If the reed is not responding as you wish, sand each blade with #600 wet/dry sandpaper (place the reed on a holding mandrel and insert a plaque before doing this).

b. Keep in mind that you are attempting to get this new reed to respond in a basic way, not as a finished recital reed.

11. Repeat steps 4-9 as needed in trimming the blade.

12. At this point, regularly check the blade thickness on a dial indicator as you continue to trim the blade. To do this, you will need to place marks at certain points in the center of each blade and have a predetermined set of thicknesses in which to refer. The idea is to trim your blade to your reference thicknesses. The dial indicator checks your progress on the trimming.

    a. the measurements I use are:

    1 millimeter (mm) from the tip = a thickness of .24 mm
    4 mm from the tip = .51 mm thickness
    10 mm from the tip = .63 mm thickness
    18 mm from the tip = .76 mm thickness
    shoulder step (right before the bark starts) = .94 mm thickness

13. Use various tests to determine if the blade has been trimmed correctly:

    a. Crow test: put the blades all the way in your mouth and blow; listen for a combination of high and low sounds, pitched at approximately E-natural in the staff.

    b. Touch test: with a plaque inserted, use your thumb and index finger to judge the thickness of the tip from one the left quadrant to the right quadrant and from one blade to another. You are looking for balanced blades.

c. Visual test: look at the blades under a high-intensity light (you should have a portable light, one small enough so that it can be transported easily into a practice room). Does one blade have darker spots as opposed to the other blade? Both blades should be balanced.

d. Playing test: play a few notes on your instrument full range to determine how the reed responds. Is it too resistant? [blades too thick; tip too open] Are higher notes hard to produce? [possibly too much cane taken out of the back of the reed] Is the reed too flat, especially as you ascend? [blade may be too long; tip may be too thin; too much may have been taken out of the back]

The goal of this initial trim is to get the reed to a point where it responds at a fundamental level (a practice-room reed). You should play on the new reed for 15 minutes, soak it for 1 minute to rinse, and place it back in your reed case. Let the reed sit for 3-5 days so it will adjust to the initial playing session (the blade vibrations help break in the reed; temperature and humidity will continue to affect the reed). When you come back to the reed, you will probably find that the it is more resistant. Trim it again, but only a slight amount this time. For this trimming, you are trying to get it to respond a bit better for that day, nothing more. Play on it for 30-40 minutes, rinse for 1 minute, and put it back in your reed case. Let it sit for a couple of days. It is this playing/resting cycle that will give you a supply of great reeds.

Additional Blade Trimming Hints:

- ➤ Leave the spine (center of the reed from back to front) alone more often when trimming; instead, trim the valleys, back of the blade, front of the blade, and around the half-moon first.

- ➤ The spine should always be visible under a light, from shoulder to tip (it will appear as a thin line).

- ➤ The spine is generally slightly wider in the back, like a triangle whose base is sitting at the shoulder.

- ➤ As the reed starts to blow freely, you can round off the spine slightly, on top, by lightly sanding; any thinning of the spine should be done with sandpaper only.

- ➤ Don't immediately jump to the heart area when trimming in order to get quick results in response. The reed will be unstable if you do this. The heart is an area in the center of the front 1/3 of the reed blade.

- ➤ Leave the edges of the sides thicker to aid in projection and resonant tone.

- ➤ Always test the reed after any minor adjustment.

- ➤ When looking at a reed under the light, mark the area to be trimmed (any unbalanced spots) with a pencil.

- ➤ Before starting a trimming/filing cycle on a blade, look at the tip area. If it is already thinned stop trimming or filing when you reach 1/4" - 3/16" from the tip (in other words, avoid the tip area in this case). A trimming/filing cycle is the removal of a small amount of cane in a continuous direction from shoulder to tip)

- ➤ Don't shape the half-moon until the reed blows freely.

- The half-moon should not curve back too far on the sides.

- Trimming the tip involves only the last 1/32". This will aid in tonguing. Don't move the knife back farther than 1/32".

- To improve response, hold the reed at a 45° to #600 wet/dry sandpaper placed on a flat surface and drag it gently towards you several times. Repeat on the opposite blade.

- To darken a bright reed, hold the reed blade at a 90° angle with your thumb and forefinger and sand side-to-side. Follow up, if necessary after testing, with the 45° angle sanding.

For a more detailed approach to trimming the reed, consult Taking the Mystery Out of Adjusting Commercial Reeds, available at desertrosereeds.com.