A Brief Reed Making Guide

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This guide is intended for oboists who are familiar with the basics of tying and scraping reeds. It covers what I consider to be the most common problems and issues of oboe reed making for more experienced players. The information here is an amalgam of ideas gleaned from several teachers and my own experience. While I am greatly indebted to John Mack for most, if not all, of the information presented here, it is difficult for me to say at this point how much personal slant I have put on it over the years. What follows works for my purposes, but represents only one of many ways of approaching this subject. It is not by any stretch of the imagination meant to be "definitive".

I. Selection of cane, gouge and shape

A. Why are the gouge and shape so important?

1. The first priority in reed making is to have the sides of the reed seal securely from where the cane makes contact with the tube, all the way to the sides of the tip of the reed. The sonic subtleties of gouge, shape, cane quality and scrape are certainly important, but pale in comparison with this one essential aspect of the function of the reed. Any small leak, especially at the tip, will result in reduced response, and any significant leak will make the reed unplayable.

2. Assuming that the gouge and shape applied to the cane are workable, the first important variable in reed making is the cane itself. To assure a good seal when wrapped, the cane needs to be selected from a straight section of cane stalk and the shape must be applied to the center of the gouged cane. Most gouging machines won't handle "humped" cane, so the problem is usually "swaybacked" or "skewed" cane. Both of these variations from "straight" will result in reeds that leak at the sides of the tip. A leaking tip can be overcome by embouchure, but it inevitably results in severe limitations in the stability and articulation of the reed.

B. Why shape your own cane?

1. After acquiring a good knife, sharpening stones, plaque, block, mandrel, staples and thread, it is important for oboists to invest in a shaper tip and handle. It's really a matter of trust. Can you trust any one else to select a piece of gouged cane that will be straight enough to insure a proper seal? Most cane is curved and the process of selection involves discarding an enormous quantity of expensive cane. There is always the temptation, whether selecting cane for ourselves or selling it to someone else, to fudge on the acceptable limits of curvature. We are all victims of this cost/benefit consideration.

2. It is very difficult to determine from a piece of shaped and folded cane, the original straightness and diameter of the stalk it came from. Buying gouged cane allows a much more careful examination of it's qualities before spending the time to shape, wrap and scrape it.

C. Why gouge your own cane?

1. By gouging your own cane you have complete control over the straightness and diameter of the cane you use. Straightness determines the quality of the seal and the diameter of the cane stalk will, with other factors, determine the tip opening of

the reed.

2. The gouging process also reveals much about the quality of the cane. Cane that shreds when cut by the gouger blade is probably too soft for good vibration and will not seal well at the tip. Another test for this quality is to see how much you can depress the bark of the cane with the edge of your fingernail. This can be done at any stage of processing the cane, bit it's easiest if the cane hasn't been gouged yet.

D. What do we look for in cane?

1. It should be straight and come from a stalk close to 10.5 mm in diameter.

2. It should be sufficiently fine grained and firm to avoid shredding in the gouging machine.

3. Cane that is very hard will be more difficult to sculpt and break in, but will probably last longer once it's working. It is also generally more predictable.

4. Soft cane that is just firm enough to gouge properly is more the norm in my experience.

E. What do we look for in a gouge?

1. To a certain extent the gouge needs to work with the arch and shape of the cane. Some gouging machines gouge the sides of the cane more when the cane is more arched. Theoretically the bed, guide and gouger knife should be adjusted in such a way to yield the same gouge for a wide range of arches. Nevertheless, a more consistent arch (10.5 mm) usually results in a more consistent gouge.

2. The center thickness of the gouged cane should generally fall in the range between .61 and .59 mm. Too thick and the tip openings tend to be big and uncontrollable and one ends up scraping into softer cane. Too thin and the tip openings tend to be small, the reed won't have much depth and the predominance of bark at the sides will tend to make the sound brittle. These effects also depend on the hardness and fineness of the cane.

3. The side thickness of the gouged cane, measured at the edge of the widest part of the shaped cane (the tip of the reed) should generally measure .45 to .5 mm. Outside this range the same effects as noted above occur, except that the side thickness seems to control the size of the tip opening even more than the center thickness.

4. A spring micrometer with a rounded tip is the best way the gauge these thicknesses. The spring provides a consistent pressure when making the measurement. Most cane is soft enough that a hand twisted micrometer is capable of boring into the cane. Measurements with this tool tend to be inconsistent.

F. What do we look for in a shaper tip and handle?

1. Good construction: solid ears (that won't break with an inadvertent tap against the desk or gouging machine) and a handle that holds the cane firmly without cracking it or interfering with the action of the razor blade.

2. A symmetrical pair of curves that represent the best compromise between strong seal and depth of sound. A shape that uses a straighter curve and continues to flair

out all the way to the tip will tend to seal well all the way out to the tip. Unfortunately, this shape will also tend not to have as much depth or interior volume as the shape that bulges more in the middle and runs closer to parallel at the tip. I use an Adam Joshua+2. Other successful shaper tips are the RDG Mack/Pfieffer, Adam Samson and Jeanné.

3. The width at the tip of the shape will influence the stability and size of the tip opening of the reed. Wider shapes tend to produce more tip opening, reduce stability and allow more sound. Most successful shaper tips tend to fall in the range of 7 to 7.1 mm width at the point just below the ears. A vernier caliper is useful for measuring and comaparing shaper tips.

4. Shaper tips can only be evaluated properly by making a number of reeds using consistently sized staples. The thickness of the staple wall and the interior volume of the staple will greatly influence the performance of the shape in producing a good seal and sufficient depth and volume of sound.

5. How much cane is wrapped onto the staple will also influence the seal and depth of sound. A good rule of thumb is to put just enough cane on the staple to allow the sides of the reed to just seal with one more wind to go before reaching the end of the staple. This extra wind provides just enough to secure the sides without "choking" the reed.

II. Knives and knife sharpening

A. How do we select a knife for reed making?

1. A hollow ground knife is the most important tool for oboe reed making. Razor blades are useful for shaping cane and clipping the tip of the reed and fine sand paper is helpful in thinning the the tip of the reed, but a very sharp and solid knife is essential for the type of sculpting needed to make a functioning reed.

2. The oboe reed knife requires more sharpening than knives used for clarinet, sax or bassoon reeds. The extreme thinness and curvature of the tip of the oboe reed requires the knife to hit the plaque frequently. Consequently, oboists generally need to sharpen their knives more frequently. A hollow ground knife is the easiest and quickest to sharpen. Bevelled knives are harder to sharpen and are best used to take the "ears" off a finished blank.

3. The edge of the knife should be straight when made and should be kept straight in the sharpening process. Only a straight edge can be kept consistently and uniformly sharp the entire length of the knife. A longer, sharper edge requires less frequent sharpening.

B. How do we keep the knife sharp?

1. An extremely sharp reed knife is a critical to the reed making process, mainly because we are forced to sculpt a relatively soft and flexible material. A dull knife requires more vertical pressure on the reed surface to remove cane. This pressure causes a depression in the cane which forces the knife to remove cane from areas on either side of the intended area. This is perhaps the single most common problem oboists have when scraping the tip. A dull knife tends to take cane out of the center of the tip of the reed and this results in a shrill sound.

2. A rough and a fine stone are necessary for maintaining a sharp knife. The fine stone is used until the edge of the knife becomes to blunt. The rough stone is

used to bring the knife edge back to an acute angle before finishing the edge with the fine stone. I recommend the Norton India Stone FB6 for fine sharpening and the Eze-Lap diamond permeated metal bar for the rough sharpening. The 4"x6" model Eze-Lap is especially handy because the honing surface engages the entire edge of the knife at once. This makes it much easier to keep the knife edge straight.

3. The knife is easiest to use when the burr of the knife edge is parallel to, or slightly forward of, the axis of the blade. Sharpening the knife to achieve this burr is a three stage process:

a. Hone the front side of the blade with the blade almost flat on the sharpening stone. The blade should be lifted only enough to engage the leading edge lightly with the stone.

b. Hone the back side of the blade with a greater angle, lifting the blade only enough to engage the leading edge lightly with the stone. This will angle the burr forward.

c. Hone the front side of the blade again, but only lift the blade enough to insure that the burr is more or less parallel to the blade.

4. Sound and "feel" are important elements in knife sharpening. As the blade is drawn across the honing surface, increasing the angle between the blade and the stone will eventually engage the very edge of the blade with the stone. When this happens, the pitch of the rubbing sound will increase, as will the resistance to the motion of the knife. At this point, it is very important not to increase the angle any more, since any increased angle will only contribute to dulling the knife.

5. The "acuteness" of the edge of the knife will determine how easily one can make a clearly defined transition between the plateau and the tip of the reed. This transition at the sides of the tip is critical for the reed's response and warmth of tone. The rough honing is necessary to keep the knife edge acute enough to work effectively on this part of the reed.

III. Tubes, mandrels, wrapping and "ear" removal

A. What difference does the staple make?

1. The staple has a substantial impact on the stability and pitch of the reed. The volume, taper, "ovalness" and thickness of the metal that makes up the staple are all factors that help determine these qualities.

2. Since staples are used over and over, it pays to buy nickel/silver staples are sturdier and less prone to bending.

B. What role does the mandrel play?

1. The mandrel allows selection of staples of consistent dimensions.

2. It also allows one to hold the reed comfortably during the wrapping process and serves as a guide to the proper alignment of the cane on the tube (assuming that the handle is aligned with the flat of the oval at the end of the mandrel).

C. What to look out for when wrapping the reed and removing the ears.

1. Wrapping the cane over the end of the staple will choke the opening of the reed at the point of contact with the staple. If the reed leaks after you've clipped the tip and scraped enough off the tip and heart to test the seal, make a new reed.

2. Waxing the thread prevents leaking between the threads at the point where the two blades come together around the staple. Not all reeds will leak at this point, but it happens often enough that it would be a mistake to dispense with the wax. Even if you forget to wax the thread before wrapping, you can usually work enough wax into the thread after it's wrapped to stop the reed from leaking.

3. A bevelled knife is more convenient than a hollow ground for removing the "ears" after the cane is wrapped. Place the flat side of the knife flush to the side of the reed just below the ears and cut off the ears by continuing the trajectory of the shape. Fine sandpaper or emory board will remove any residual cane left after using the knife. Leaving any remnant of the ears on the cane can produce a flare at the tip that will cause the octave left hand notes to be flat. The residual cane is much more difficult to remove after the tip has been clipped.

IV. Scraping and balancing the reed

A. Scraping technique

1. The safest and generally most effective way to scrape a reed is by a rapid succession of fast and light strokes with a firm grip on the knife. If the knife is sharp, very little vertical pressure is needed to remove cane. This scrape is analogous to the motion of a circular saw. The speed of the blade makes the circular saw an effective cutting tool. Knicks and torn tips usually result from a slow or dull knife applied with too much vertical pressure.

2. One must be able to make long scrapes using the thumb to push the blade, as well as short, scooping scrapes using the thumb as a pivot point for the top of the blade.

3. Sometimes in defining the tip of the reed, it is necessary to apply more vertical pressure to cut into the cane. This must be done very carefully and with an immediate release of pressure as the knife moves forward. It's best not to use this technique too close to the sides and end of the tip.

4. In making the initial scrape of the tip, it's possible to save time and reduce the vertical pressure on the cane to zero by actually cutting or slicing off cane. This is a delicate and risky procedure not to be attempted by the feint of heart.

B. Preliminary scrape and initial clip

1. Start the scrape by taking about 4 mm of bark off the tip of the reed. Scrape straight across the tip, but leave more cane in the center. Make the slope a straight line from the bark to the end of the tip. The side profile of the reed at this point will look somewhat like a sharpened pencil. From beginning to end, the goal of scraping the tip is to leave more cane in the center than in the sides and corners, while maintaining a continuously downward slope to a point at the end of the reed where the cane is extremely thin.

2. Scrape the bark off the back of the reed to a point about 4 or 5 mm from the thread. Leave a margin of bark at the sides of the back. Further scraping of the back will be directed along an axis on either side, midway between the center line and the side margin. Strength in the center and sides of the plateau and back are

essential for the stability of the reed and the firm closure of the reed all the way to the tip.

3. Clip the tip about 1 mm from the top fold. This initial clip can be damaging to a finely sharpened knife, so it's a good idea to do this with a razor blade or another knife. A new razor blade is the best tool for clipping the tip of a reed at any time, but I don't do this because it's a bit tedious to put down the knife and pick up the razor blade every time I want to clip the reed.

B. Forming the tip of the reed

1. After clipping the tip, continue scraping the tip to produce a "pencil" profile as in section A1 above. This avoids a tendency at this point to take too much cane from the center of the tip. Eventually the profile of the transition from plateau to tip will look like the slope of a sandy beach with an "S" curve that descends rapidly immediately in front of the plateau and then continues to descend gradually to the end of the tip. For now, stay with the "pencil" profile.

2. The next step is to insure that the sides of the tip are as thin as possible. One way to accomplish this is to scrape the sides and corners of the tip with the knife at a 45 degree angle. A fast and tightly rotated stroke will avoid the center of the tip and allow the blade to "level off" before coming to the corner of the tip. Any vertical pressure on the fragile corner will cause the knife to chop right through. This isn't necessarily a problem if you are planning to clip the tip for other reasons.

3. As most reed makers quickly learn, the finishing scrape on the tip is the trickiest. At the end of step 2 above, there should be too much cane in the center of the tip. This is good. You can always take more off as you balance tip, plateau and back. (No one has yet found a good way to put cane back on the reed.) I generally finish the initial formation of the tip with the knife at a slight angle and a stroke that defines the tip from the plateau to make the "S" curve mentioned in step 1 above. You will probably have to thin the front of the plateau to help make this transition to the tip. Most of the knife strokes in this phase will end up on the plaque off the end of the tip. It is critical that the end and sides of the tip are as thin as possible. The knife should ultimately glide onto the plaque, rather than fall off and make a "click". In the first several days after wrapping the reed and as the cane swells from repeated drying and soaking, there will always be more cane to remove from these areas.

4. The initial formation of the tip will probably require it to be clipped several times. It is important to remember that every time the tip is clipped it gets thicker. This will generally produce a brighter and less responsive reed until the sides and very end of the tip are thinned again.

C. The crow and balance between tip, plateau and back

1. After forming the tip and plateau of the reed, it should crow a single octave "C" or above. The reed should also be slightly hard. If the reed is hard and the crow is flat, it will be necessary to reduce the length of the reed and remake the tip.

2. The goal of balancing the reed is to allow it to have a warm, vibrant sound, stability, flexibility and response within a wide dynamic range. Oh yes, in addition to all these other good traits, it also needs to be in tune. Fortunately, there is a test that is a pretty good indicator of when the reed possesses these qualities: the octave "C" crow, produced by blowing on the reed with the lips on the cane directly in front of the thread. If the reed produces two clear tones an octave apart, without

undue air pressure, it will probably work pretty well, or at least be in the right "ball park".

3. The plateau and tip are the areas most responsible for the upper octave crow. The plateau and back are the areas most responsible for the lower octave crow. The lower octave crow will indicate depth of sound and ease in low register and can be produced by scraping on the back and plateau of the reed.

4. The strength of the plateau will control the opening of the reed and determine how much embouchure is needed to control the air flow and dynamic range of the reed. The plateau and back are also the areas responsible for maintaining the stability and seal of the reed. They should be scraped reluctantly and only after the tip is properly formed and thinned. The back of the reed is best thought of as the area of last resort. It should be scraped only when more depth cannot be safely obtained by scraping on the plateau.

5. Scraping on the plateau and back of the reed will also change the apparent vibrancy of the tip. Since all parts of the reed connect to, and affect one another, it is in fact a balancing act to make them work together. Two principles help in this respect: keep the crow as close to "C" as possible and always work from the tip back. I would estimate that 95% of the problems I encounter with reeds are tip problems and 95% of the reeds I ruin are ruined because I took too much out of the back and plateau without finishing the tip properly.

6. The pitch of the reed is only indirectly connected to its length. The stability of the reed, however, seems much more closely related to its length. Longer reeds tend to be more stable and for this reason I always trying to make a reed with the pitch, response and sound qualities I want, at the greatest possible length.

V. Managing the reed "bullpen"

A. Since reed cane requires two or three days of the soaking/drying cycle to adjust and become stable (probably the biggest factor is that, over the course of this time, the cane stops swelling as much each time it's soaked), it is best to maintain a stable or "bullpen" of reeds that are in different phases of their careers. The average useful life-span of a reed of the average reed is probably about 7 hours of playing time (assuming that it doesn't die of "unnatural" causes, i.e. an encounter with your reed knife, tooth or music stand, etc.). An hour or two of this time will be spent bringing the reed to its optimum performance. It's best to do this while you're practising and no one is listening to you.

B. The "old-timers" in your case will eventually have to be retired. Old reeds tend to lose their strength and close down. Corners of the tip become frayed , response and dynamic range go down hill. Sometimes after a good soak, they display some of their former glory, but usually for only a few minutes. These reeds are best relegated to the second reed case and brought out only in emergencies as "closers" or instructive examples to students. The main point here is that you always have to be cultivating fresh "talent" and it's best to bring this talent along gradually, with a certain amount of competition for a spot on the starting line-up. Placing all hope on one or two "stars" in the bullpen, no matter how well they play at the moment, will eventually drive the manager/owner crazy.