PLASTIC CHANTER REEDS

These notes have gone through various editions as my ideas and the materials available have changed. What you will read here is by no means the last word on the subject, but as of the time of writing, as far as I am concerned it is the latest.
The reeds were developed for the bagpipes which I make. They would not necessarily suit a chanter of different design, though the methods and principles may be useful elsewhere, and the dimensions can be changed as appropriate. The dimensions initially given here are for a chanter in G; dimensions are given at the end for A and low D. Note that I also use the reed of G dimensions (with no modification other than final finishing) in my highland fingering lowland chanter in A.

TOOLS:

Scissors
Mandrel: made from a piece of 8mm tool steel about 150mm long; turn one end to a taper to fit inside of staple; file tapering 'flats' 20mm long symmetrically on opposing sides of the tip, ending up with a slightly ovalised shape to the tip, the minor axis measuring about 1.5mm. See attached sketch. Alternatively you can buy an oboe reed mandrel from woodwind suppliers, and modify it as above.
Small vice: a swivel vice which clamps to your bench or table is useful but not essential.
Sharp knife: for scraping, a stiff blade such as that of a pocket knife is ideal, and it must be really sharp. A blade curved along the edge, allowing selective width of scraping is even better. For trimming the ends of the blades a Stanley knife with a fresh blade is best, especially in the case of Mylar (see below).
Long-nose pliers: preferably with flat, smooth jaws with a width of around 6-8mm.
Burnisher: a length of 6mm hardened polished silver steel in a wooden handle. (A screwdriver will do; the smoother and more polished the shank, the better)
Small hard wood block: with very smooth surface; the ideal is end-grain boxwood, 60mm square, 20mm thick.
(**Reed blade shaping tool**: see note below)
Abrasive Paper: 320 and 500 grit, lubricated silicon carbide. See below.

MATERIALS:

Plastic pot for the reed blades: For many years in common with many other makers of similar pipes I have used food pots, typically those for yoghurt, fromage frais or crême fraiche. It used to be easy to find a suitable pot, but it is becoming more and more difficult. The main reason for this seems to be that manufacturers are changing the raw material from polystyrene (PS - good) to polypropylene (PP - bad). Usually you will find PS or PP embossed on the base of the pot. PP will be no good. So the criteria for a good pot are as follows:

1. Made of polystyrene (PS)
2. Its diameter is in the range 80 – 120mm diameter; the diameter controls the tip opening.
3. The thickness should be between 0.3 and 0.4mm. If it is less than 0.3mm it is likely to be not stiff enough.
4. Hardness: food pots range from soft to quite brittle. Too soft and it may not work at all, or the tone may be dull. I can't say that I've found one that's too brittle, but it's possible, and could be vulnerable to cracking. So a pot which is not too extreme in this respect.
5. It should respond well to scraping and sanding; not all do. Some can be sanded but not scraped. That does not matter because good results can be got from both finishing methods.

Prepare the pot by slicing off the bottom by cutting with the knife round the bottom corner. Make a single cut from top to bottom with scissors so as to open the cylinder. Remove the top moulding; it may pay to do this a little way down from the top if the material there is very thick. Again with scissors reduce the height of the open cylinder to 35mm, removing material from the top or the bottom, or both, so that the remaining material is of relatively even thickness. If you can detect a taper across the height of the cylinder, regard the thin end as for the lips of the reed, and vice versa.

Mylar Sheet for the reed blades:

Because of the increasing difficulty of getting suitable pots, I have been experimenting with an industrial plastic sheet usually called Mylar. This is actually a trade name owned by Dupont; the material is a resin known as Polyethylene Terephthalate (PET). It's available from various sources; one such is www.stencilwarehouse.com. I find that 0.25mm (250 micron) thickness works best. This may seem thin, but the material is stiffer and harder than polystyrene. At the time of writing, an A4 sheet is available on Ebay for £1.49, which should yield at least 60 reeds.
Of course, it comes in a flat sheet, whereas we want it to be curved. This is relatively easy to deal with by heat treatment. The idea is to fix it temporarily to a smooth cylinder, apply heat for 1-2 mins, then cool it and remove from the cylinder.
I use a heavy aluminium tube with a diameter of 75mm. Cut a strip of mylar the appropriate width for your reed - 35mm in the case of G – and long enough for one turn round the former ie about 230mm long. (If it is a strip from the width of an A4 sheet it would be 210mm long). Wrap it round the former and tape the ends together with masking tape in such a way that the mylar is firm against the former all the way round. Immerse the whole thing in boiling water for about 2 minutes. Remove and immerse in cold water until cold. Remove the masking tape and the plastic should hold its round shape. It may relax by a small amount subsequently.
Thereafter you can treat it as you would a pot, with the following reservations:

- Use abrasive paper as above; it can't be scraped.
- It may or may not need to be squeezed to form an arch or spine.
- The whole process seems trickier to get right than with PS.
- Use a new stanley blade in your knife to cut the tips; the slightest imprecision here will wreck the tone quality.
- Be prepared to use the corner of a very fine sheet of wet-and-dry paper (1200 grit) between the lips of the reed to clean them up. It may not be necessary. If it is, insert a corner and pinch the tips of the reed between finger and thumb while pulling the paper out. Repeat with the paper the other way round. Alternatively, insert and remove the stanley blade as above. It seems to work just as well.

Staples: standard oboe staples, cork removed and reduced in length to 31mm by cutting off the wide end. See notes.

Waxed thread: best diameter is 0.5mm or slightly above. You could use the same yellow hemp as you use for your drone sliders, or get suitable reed making thread from woodwind suppliers. You can wax a length as you go by rubbing with a small block of beeswax, or you can immerse a spool of thread in hot melted beeswax. Once you think it has absorbed as much as it will, take it out, drain and cool. Don’t get the wax too hot, especially if the thread or spool is plastic, because they may melt.

PTFE tape: - white plumbers tape.

METHOD:

1. Prepare a staple by placing it on the mandrel. Flatten the end to conform to the flats filed on the mandrel by squeezing between the jaws of long-nose, smooth-jaw pliers. You can form a nice 'eye' with a burnisher (or any smooth steel rod) by firmly stroking towards the tip. The minor dimension of the eye may be important. Somewhere between 1.2 and 1.5mm will probably be about right, and it may depend on what plastic you are using.

2. From the 35mm high open cylinder prepared above, cut two blades to exactly the same trapezoidal shape, 10mm wide at the lip end and 3.5mm at the other, 35mm long. It's likely that one edge of the cylinder will be thicker than the other (but not in the case of Mylar). Align the blades so that the tails are at the thicker end. If you are making a lot of reeds, a shaping guide is useful. See note below. To get consistent results you need to be precise about the shape. There is much room for experiment here. You may find it useful and interesting to experiment with very small changes and note the results, which can take much work to refine.

3. Temporarily secure the blades together (concave surfaces facing) by folding a small square of 19mm masking tape across the lips or you can bind with a few turns of waxed thread.

4. Position the vice on right hand end of the bench (if you are right-handed), or if it is a swivel vice, place it anywhere but angle it at 45 degrees; this is so that your hand does not hit the bench when winding on the thread. Place the mandrel in the vice, with flats above and below.

5. Place a prepared staple onto the mandrel, and slip the blades onto the staple. Using the free end of your reel of thread, secure them with a clove hitch round the tails. Adjust the position of the blades on the staple so that the tails are 13mm from the large end of the staple. Bind with firm, close turns of thread so that the edge of the last turn comes 34mm from the large end of the staple. Make the last turn a half hitch. Wind back to the start with two or three wide turns, and finish off with two half hitches.
Wind thread onto the bare end of the staple to suit the reed socket in the chanter. Start 1mm from the open end of the staple, trapping the end of the thread with the first few turns; wind tightly and with close turns up to the tails of the blades; back to one-third of the length of the binding with one turn, then close turns for the remaining two thirds back to the tails; then a couple of turns and two half-hitches to finish off. The aim is to produce a tapered bunch of thread which will fit the corresponding taper of the reed socket. The fit of the reed in the socket should be such that the end of the staple is just held out of contact with the wall of the socket.

6. Remove the mandrel from the vice. Cover the thread binding the blades onto the staple with a few turns of PTFE tape. This is to make it airtight. Start from the blade end; make a couple of turns there, just covering the end of the binding, then a few diagonal turns towards the tails; make a couple of turns above the socket binding; pull the tape to break it, and rub it down with the fingers.

7. It is usually necessary to give the blades a *little* more arch in the throat area (but may not be necessary in the case of Mylar). Do this by squeezing across the width in the middle of the binding; a fair amount of force may be required if the plastic is on the thick side. The sides of the blades may open slightly. You may observe a very slight ridge or spine. Then squeeze in the opposite direction to restore the shape of the reed. The sides should be closed, but there should be a visibly greater curve in the centre of the blades above the binding. This area can be closed further (or opened) by gentle pressure to adjust the response later on. It is impossible to describe precisely the extent of this process. The type of plastic, the pitch of the chanter for which the reed is intended and other factors influence the degree of the arch. So try, and see what works.

8. Finishing by scraping: A new heavy duty stanley knife is adequate, though a slightly curved edge (convex) blade is better as it can be used more selectively. First trim any excess off the tip by reducing the overall length of the reed/staple to 46mm; lay the reed flat on the cutting block and make a vertical cut over the whole width of the tip at once.
The degree of scraping required depends entirely upon the quality and thickness of the plastic, and the required response. It is impossible to say how many scraping strokes should be made, because it depends upon how much material is removed at each stroke. If you are used to scraping cane, with plastic you should be removing much less at each stroke. Don't try to remove too much at each stroke. Attempt a mean between skating over the surface and digging in. You can make some diagonal strokes working towards each tip.
Start by scraping very lightly all over, to remove the printing and surface gloss. Then the objective is to lower the resonance of the reed by scraping until the reed gives the correct response in the chanter. Start with 5 or 6 strokes from just above the binding towards the tip. The scrape will be mainly in the centre of the blade at the binding, but across the full width at the tip. Work progressively towards the tip, finally working on the last 2-3mm. Continue until the tuning, response and sound quality is correct. It may be necessary to raise the pitch of the reed by clipping the tip. Don't take off more than about 0.25mm at once. It's best not to reduce the overall length of the reed below 45mm, but all will depend on the thickness and stiffness of the plastic. Remember that you can also alter the response of the reed at this point, by adjustments in the degree of opening at the top of the binding. Most often the reed will need closing here, which reduces playing pressure, and improves overblowing. It can also make low G more pressure sensitive, but this can be rectified by further scraping.

9. 500 grit silicon carbide paper is useful for refining the tips of the blades. Hold the staple between thumb and third or fourth finger, pressing the blades onto the paper with the tip of the index finger. Aim to treat only the last 4mm or so. Adjust downward pressure and the amount by which the end of the staple is raised accordingly.

10. Finishing by sanding: if you prefer this method, I suggest you use a lubricated silicon carbide paper (such as 3M Trimite Frecut) no coarser than 320 grit.

Proceed as follows:

- support your abrasive paper on a wooden block 60 x 60 x 20mm
- cut a small rectangle of paper 80 x 20 mm
- with the finger and thumb of your left hand, trap the ends of the paper on the sides of the block, with the edge of the paper 1mm back from the edge of the block nearest to you
- hold the staple between thumb and third or fourth finger, pressing the blades onto the paper with the tip and first joint of the index finger, the binding touching lightly against the edge of the block
- rub side to side for the full width of the block; count 10 strokes or so on each side before testing. Be aware of the way in which the pressure of the pad of your index finger is distributed on the blades of the reed. You can vary the pressure to favour the tip, centre or root as necessary.

Mylar wears out abrasive paper faster than styrene, so you will need to change it more often. When the paper is worn, the blades will need more rubbing than when it is fresh.
Don't move too fast. You want to avoid heating the blades which might relax the degree of curvature.
Depending on the initial thickness of the blades you may need 20 or more strokes per blade. The response of the reed when nearly finished can often be refined by restricting the removal of material to the tips of the blades.

NOTES

DIMENSIONS FOR CHANTERS IN A.

1. Staple length, 30mm.
2. Distance from large end of staple to blade tails, 12mm.
3. Finished blade length will be slightly less, 45mm or less.

DIMENSIONS FOR CHANTERS IN D.

1. Staple length, 40mm.
2. Blade Shape: initial length 44, tip width 10.5, tail width 4.
3. Binding on: distance of tails from open end of staple, 15mm.
   binding up to 44mm from open end of staple.
4. Overall finished length, about 57mm.

BLADE SHAPING GUIDE:

Take a pair of long nose pliers. Grind out between the jaws to take a pair of pieces of metal with the same dimensions as the reed blades (but slightly longer at the wide end), and having the same curvature. Braze one piece to each jaw (curves matching rather than opposing), in such a position that when the pliers are closed, a blank is held firmly overall. A sharp blade along the edge of the metal inserts then cuts the blank to shape. A small snap-off blade knife is convenient for this. Keep your scraping knife just for scraping.

STAPLES: These are available in quantity from Guercio, Wombacherstr 65, 97816 Lohr-Wombach, Germany. Email: guercio@t-online.de

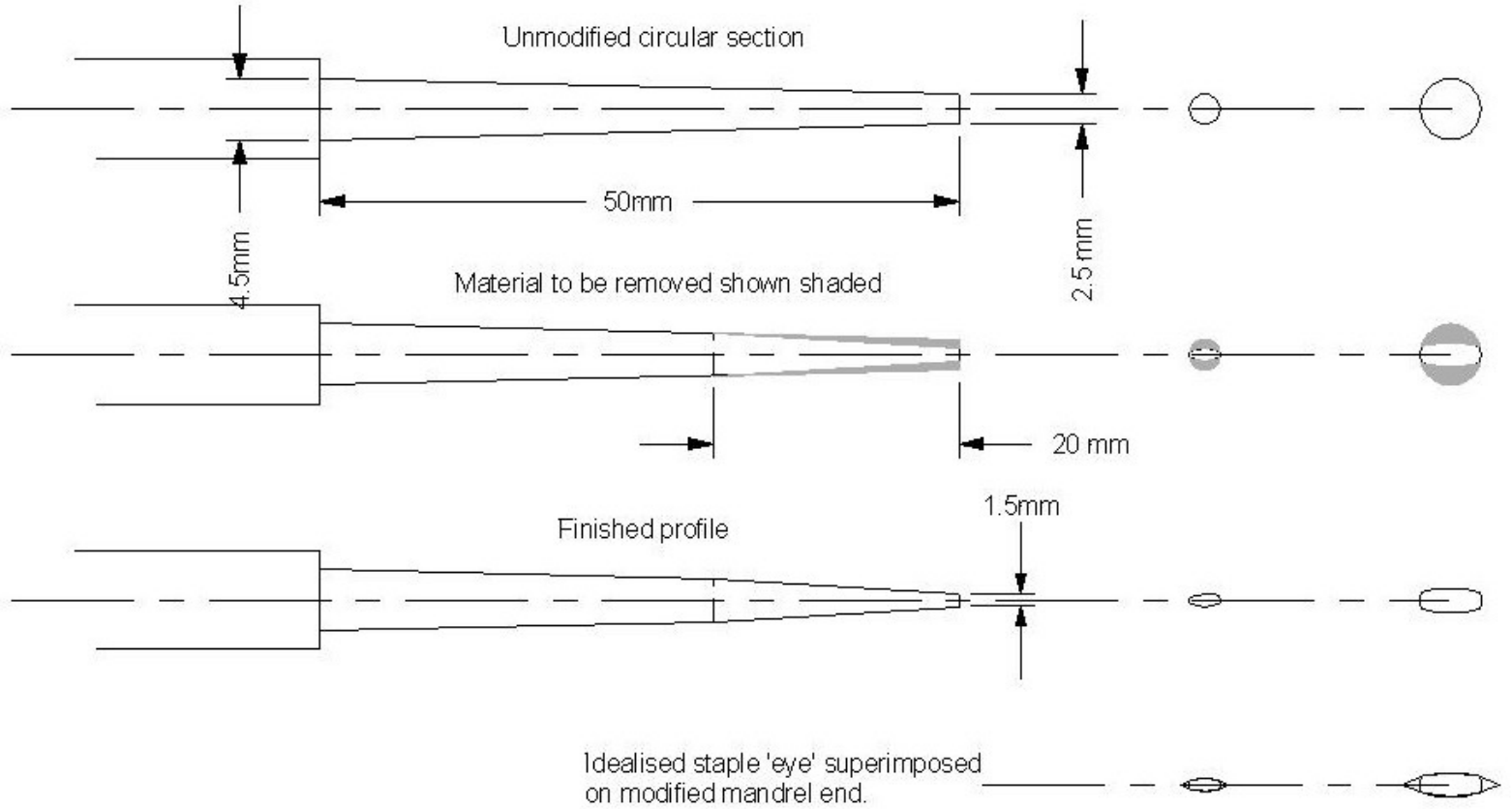
SOME WOODWIND ACCESSORIES AND REPAIR SUPPLIERS

Windcraft Ltd
https://www.dawkes.co.uk/windcraft

Wind Plus Ltd
https://www.windplus.net/

Howarth of London,
https://www.howarth.uk.com/

Mandrel for reed staples.



Scale = 2:1. End views also shown 4:1.