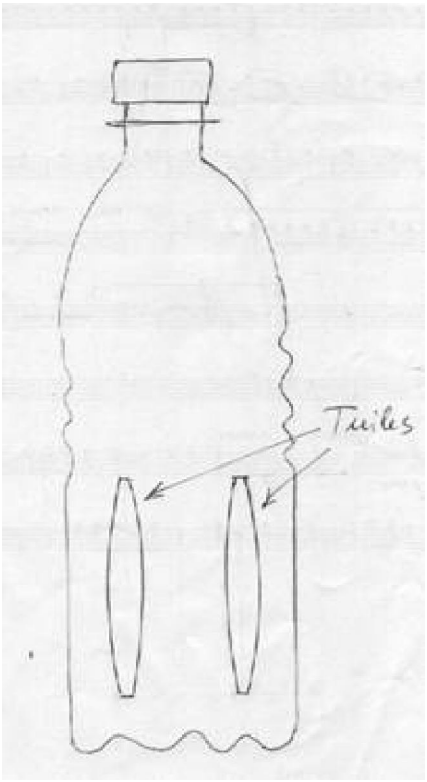
Manufacture of plastic reeds for oboe

Sept. 2010

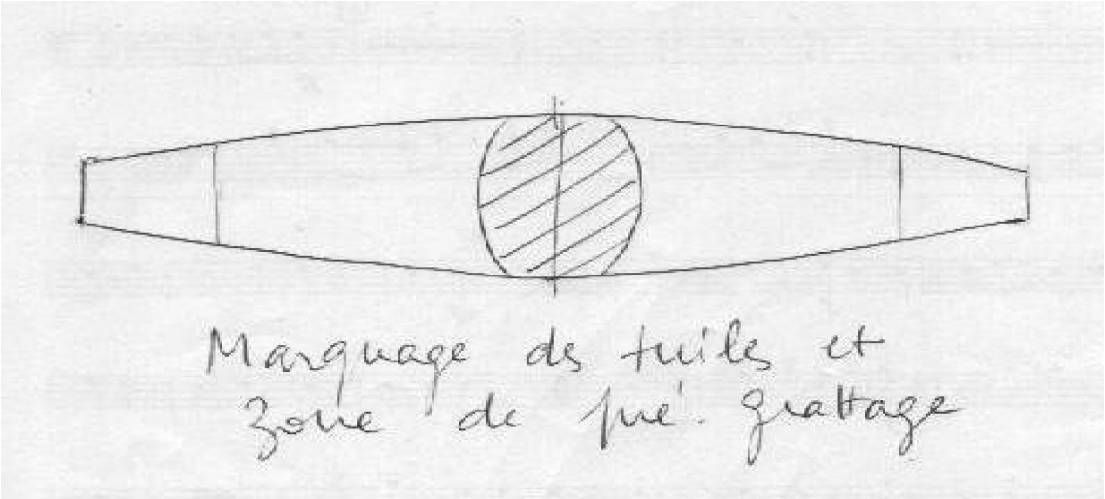
An oboe reed is traditionally made of cane. These few grams of material determine the tone, the accuracy and playability of these instruments. Unfortunately, reeds as objects are whimsical, whose behavior can vary from day to day and even during a session depending on the humidity or temperature. They are also short-lived because the fragile reed quickly loses its elasticity. Much of learning the oboe is to master the manufacture of reeds. The other part is learning to accept that one has to adapt to the reeds quirks and peculiarities, while mourning for that special reed we had before this one.
In short, oboe players could devote more time to making music if they had a durable reed, and life would be simpler if they could count on it being reliable and stable.
It is this question I tried to resolve by making reeds from plastic.

The material I use for oboe reeds is bottles of sparkling mineral water (the bottle of Saint Yorre of 0.5 L has a diameter appropriate for oboe baroque or modern, and the cylindrical shaft is high enough to cut out the slips).
I cut in the longitudinal direction the same shape slips as the traditional gouged and shaped cane. As with the latter, the form(shape) of the slip has a considerable influence on the diapason of the reed. To make sure all the slips are the same, I cut around a metal template.



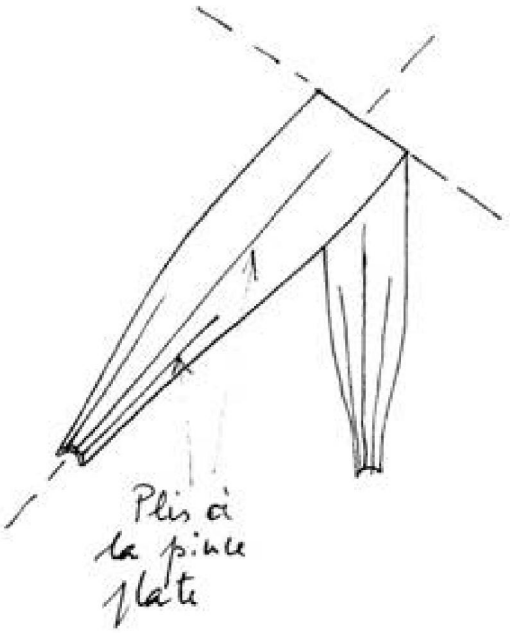
I mark the axis, the center line and the limit of the binding, with a permanent marker. The slip is

transparent, and marks made on the inside (concave) of the slip will still be visible after sanding, to help during assembly.
I pre-sand the slip, by rubbing with an abrasive P800 grit mounted on a half round rod, to thin the central part of the slip, about 1 cm (5 mm on either side of the middle line of the slip). It has to be flexible enough for the slip to fold in the middle to a sharp angle.



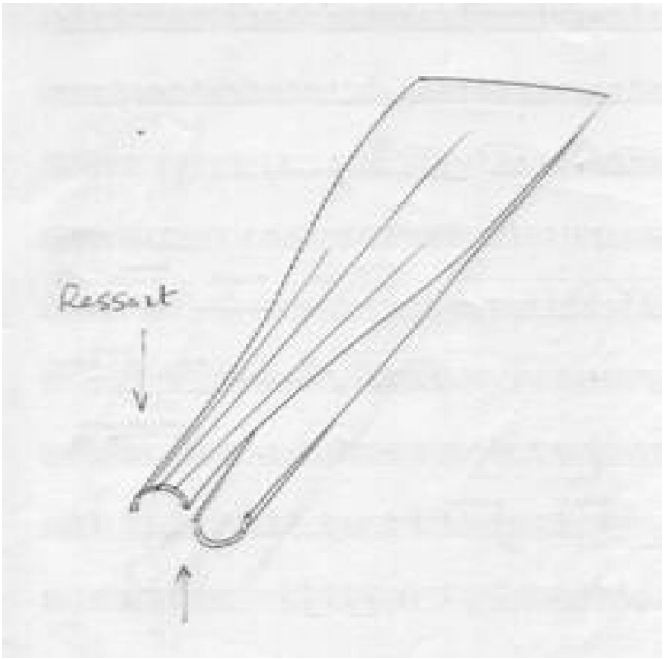
The reed must have a sort of backbone, very pronounced at the heel, continuing up to 8 mm from the tip, so I fold the slip longitudinally with flat blade pliers.
I make two folds to pre-form the staple end to match the tube of the reed. These folds (optional) going at a slight angle away from the middle line of the reed.

I then fold the slip, making a sharp angle on the middle using the flat blade pliers.

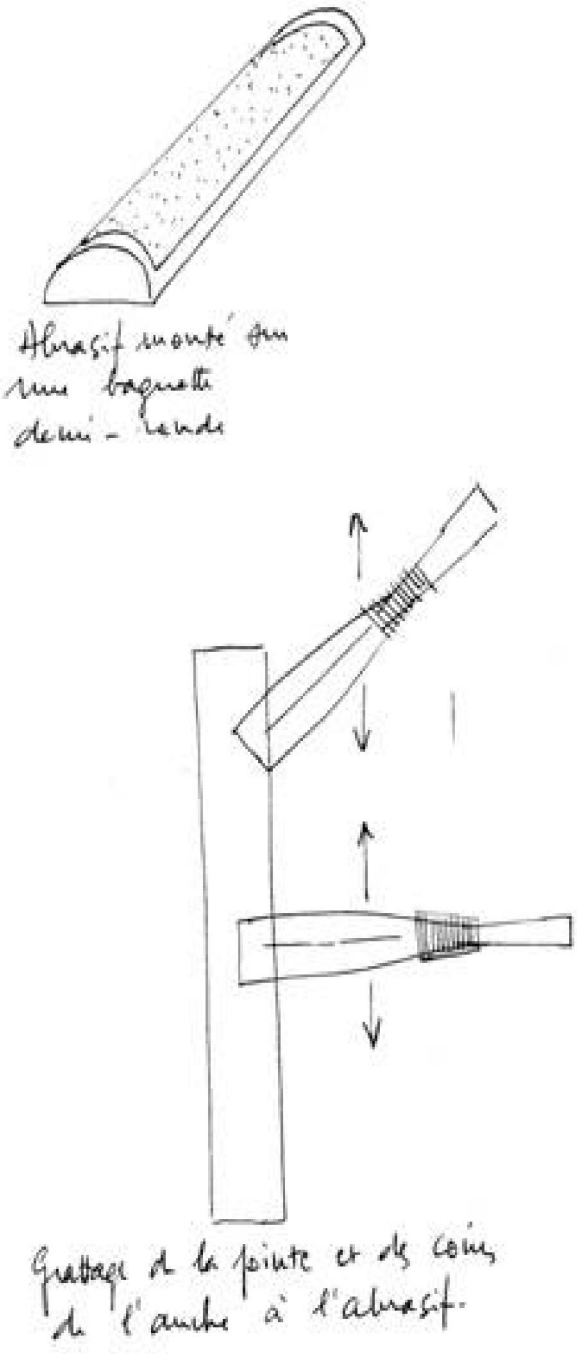


I bind the tip end of the slip with Teflon tape or cellotape to maintain the two blades together..

I check that the edges of blades make a good fit when the blades are folded against each



other. It should have a slight spring, not hard and without effort to close the blades by the heels, also without a tendency to open the tips of the blades. This "spring" of the reed is crucial because it determines the hardness and the opening of the reed. Because the material is "plastic", you can set the elasticity of the spring by retouching the longitudinal folds of the blades. I then tie the blades onto the staple, using the conventional techniques as used for cane reeds. At this point, I finish sanding the tips of the reed (the tip, corners, just the sides) with the aforementioned abrasive stick. I sand slowly to avoid heating the plastic, leading to its deformation.

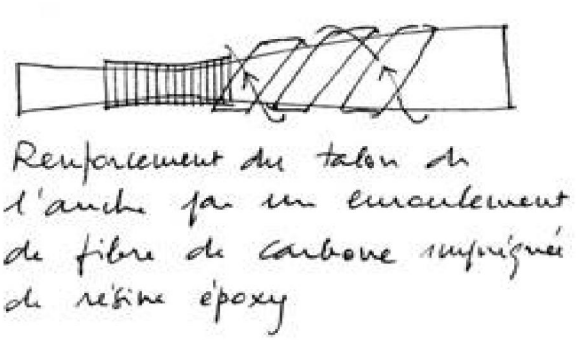


Only at this point, I cut the tip of the reed with scissors, removing as much as necessary to obtain a satisfactory tip opening. If I do not cut off enough, the reed is too small and closed, if I cut too far, it is too hard and open. A good compromise is a cut to about 1.5 mm back from the fold.

The reed may now speak, quite often very well. However, being made from a thin material and of uniform thickness, there is a lack of stiffness in the heel; the vibrating surface of the blade is greater than necessary. As a result, the reed is too low, by about a semitone. We can obviously raise the pitch by cutting the tip of the reed, but lack of material in the heel will still allow too

much freedom in pitch, which would make controlling the reed tiring after a while.
For this reason, I add some material around the heel and possibly the center of the reed. There are several options:

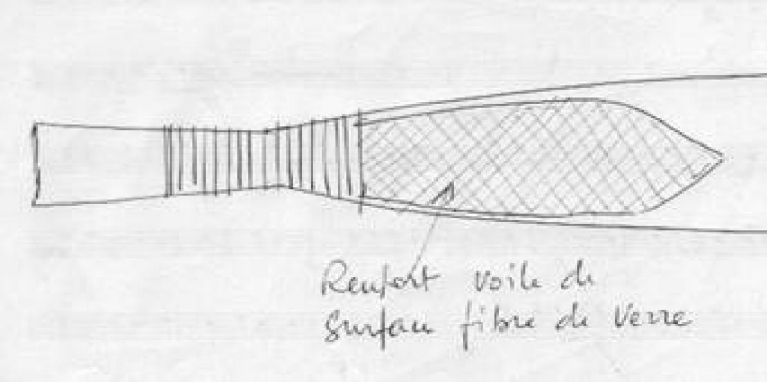
Option 1: I wind a carbon-fibre or glass-fibre strip impregnated with epoxy resin from the heel to halfway up the reed (about 12 mm in total). The coils can be tight at the heel end and less so on the way to the tip.



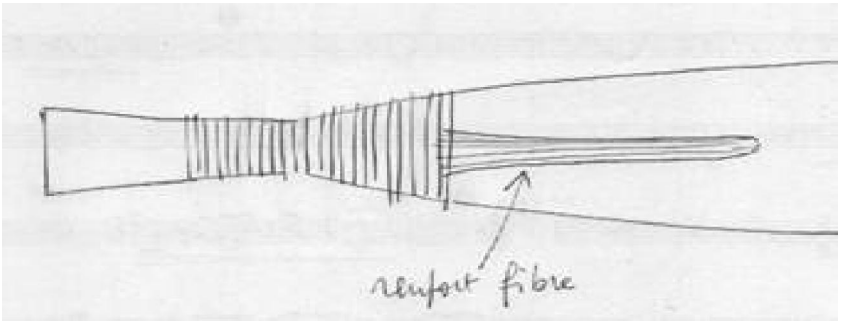
To prevent the resin dripping, I wind Teflon tape around the binding. This is long, delicate and messy, but it makes reeds that work.

More convenient and faster, also it is also possible to fix the fibre with superglue. Attention: all cyano adhesives are not suitable, polymerize too quickly, releasing a lot of heat, which deforms the plastic blade. I know of at least one satisfactory brand of cyanoacrylate glue: Axton. The bottles fitted with a brush are very convenient, making a very good, clean and instantaneous joint (interesting, to be able to try the reed quickly ;-) Method 1 with the epoxy adhesive does not allow that. Even with cyano glue, one still has to wait a few minutes before playing as the vapors of the glue are very irritating. When I use this method, I prefer fibreglass to carbon fibre as the material becomes transparent when it is properly impregnated with cyano glue, which allows a useful check on the quality of bonding.

Option 2: I stick to the center of each blade of the reed a small panel of fine cloth fibreglass. The adhesive may be epoxy resin, or simply nail polish. Avoid the cyano: with the large specific surface area of cloth fibreglass, , the polymerization of the cyano is so fast that it causes a thermal runaway which distorts the blade. The technique of the soft surface bonded has the advantage of precision and cleanliness, and durability of the bonding with nail polish is good, I used such a reed every day for two years without observing any changes in its features.



Option 3: I stick to the center of each blade a backbone made of fibreglass or carbon impregnated with epoxy or glued with cyano. The edge goes from the wrapping of the reed up to 1 cm from the tip.



All these options have the same function: the winding of fibre on the heel (option 1) raises the pitch, and reduces the scope of freedom of the reed. The addition of a backbone (option 3) darkens the sound. Bonding of cloth to the surface (option 2) combines the two above effects. You have to decide which to choose based on the observed behavior of the reed (timbre, pitch, field of freedom).

Once the resin is polymerized, the reed is playable, and requires only a few alterations. The addition of stiffness in the heel and the backbone has lifted the reed to the correct diapason. The best criterion for judging seems to be the width of octaves, rather than the absolute value of the pitch (these two criteria are obviously related, but the former is more sensitive than the latter). If necessary, I scrape the reed, scraping carbon fibre or glass with a fine abrasive, without touching the edge or corner of the reed, and within the same areas of scraping as on a cane reed.
A convenient tool for scraping is abrasive glued on a rod half round, 3 cm in diameter. If the amount of fibre has been well dosed, there is very little scrape, and the reed quickly reaches its final characteristics.

A reed well made has from the outset the correct opening and will keep it. However, one can change this by opening with a bridle (brass wire) placed at mid-height of the blade. Changing the bridle can fine tune the opening of the reed.

The wall of the reed being very thin, it is sometimes difficult to ensure a good seal between the blades. That's why I always seal the base of the reed with Teflon tape. I do not hesitate to run high up the reed, say up to 10 mm from the tip of the reed: even at this height, the Teflon does not affect the sound.

With a little practice, making a series of four reeds using this method takes about two hours, not counting the time for polymerisation of the resin.
I have made satisfactory double reeds of all kinds, from bombarde to bassoon (the latter mounted on tube).

The reeds are very durable: I played the same reed on my baroque oboe for two years, and it shows no signs of fatigue.
Their pitch does not change.
No need to wet: they are directly operational.
Contrary to intuition, the sound shows no signs of the material. It can be shaped over a very wide range, from lighter to darker, from the softest to the powerful. Here are some simple rules to control the sound of the reeds. Most of these rules apply to cane reeds, and are therefore known to oboists. Some others are specific to plastic reeds, it is on these that I will focus in particular.

- A soft heel will have a field of great freedom in frequency and a low pitch, compared to a cane reed of the same measurements.
- The opening of the plastic reed can be increased at will by passing through the staple of the reed a plastic rod with the same diameter as the small end of the staple, and then forming the blades around the rod. It can also be closed somewhat by pinching the reed with the fingers. These changes can be made at any time and are reversible. A reed wide open is more powerful and lower than a closed reed with the same stiffness and same geometrical dimensions.
- A reed with much stiffness and mass on the backbone sounds darker than a reed with a thinned "heart."
- A finely scraped tip speaks with clarity. Leaving more material, the sound will be rounded.

- A lozenge-shaped opening gives a softer sound than an opening with a circular arc.
- A flat arc reed has a clear and aggressive sound, with limited frequency range. A very convex reed, allowing a large volume of air, will have the opposite characteristics.

By following these simple rules, we can produce plastic reeds that actually work. I foresee some disgruntled "All the charm of the oboe comes from the capriciousness of its reed," "All the effort to produce a good reed is found in the quality of sound," "One must suffer to merit the sound"," Poetry is related to the oboe reed, "" the god Pan weeps to see your oil derivatives "etc. ... This article is not addressed to these people. It's too late for them, the Conservatoire has had its influence on them. For my part, I will try to suffer as little as possible, and for this reason all my reeds are now plastic. I will have a small number, adapted to different types of music I want to play, and ... I will not need to change!

Re worked from the English & French texts by Dave Singleton