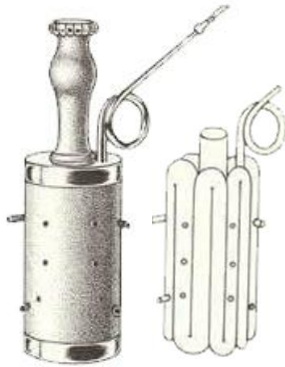
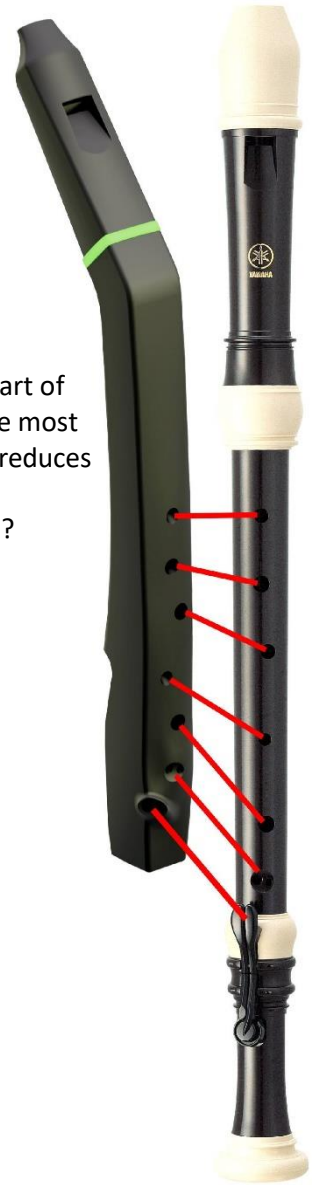


g = Geri Bollinger – Creation, ideas and development
 s = Steven Kraul - CNC and programming expert
 i = Sibö Kunath - Printer und programming expert
 oi = Monika Stommel – Key construction and bass recorder expert
 io = Jo Kunath – Workshop leader and unending source of enthusiasm!

Finding clever ways to reduce the length of the instrument has always been a part of larger musical instrument construction. The baroque style recorders that we are most familiar with today feature a narrowing bore that shortens the instrument and reduces the size and distance between the finger holes.

But is it possible to make a bass recorder that does need a blowing pipe or keys?



The rickett (C16) is a bassoon with a folded bore



Paetzold contrabass (C20) with folded bore



The snaking bore of a 18th century bass clarinet



The Yamaha Venova saxophone (C20)

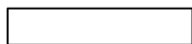
sigo tenor recorder (C21)

Development

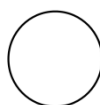
I, Geri Bollinger, already had experience with developing bore profiles. Despite my prior knowledge and skills, a direct-blow bass without keys struck me as practically impossible.

How about a new approach combining the Paetzold, Leipzig bass clarinet and Venova? My first experiment was surprising: the sound was thin, the intonation was wacky and it was a difficult stretch for the fingers, but the idea no longer seemed completely unrealistic.

The bore profile shapes the sound colour and determines the fingerings of a recorder. I wanted to retain the familiar fingerings, so whilst I based **sigo's** design upon the baroque, my design also features a very narrow cross section and tightly curved bore.



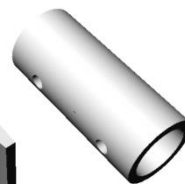
Cross section: sigo



normal



Bore: sigo



normal

For many years I believed that curves or bends in the bore had no influence on intonation and sound. With one or two bends I don't notice any flaws, yet with three there are minor disturbances and with four major disturbances, and with five it sounds unpleasant, with six it is unusable, and so on... The bore of the **sigo** tenor, however, has 18 very tight curves and an extension. This meant that the main work on this instrument was to get the errors caused by the curves and unusual bore shape under control.

Of course, the changes to the bore shape also resulted in a narrower sound, which meant that the response of the high notes was easier, but the overall sound was not very warm. The use of a conventional bore shape in the head joint compensates for this.

Although equipped with a broad range of experience I found that this alone was not enough. I was faced with an extremely exciting yet extremely formidable project. At times it was like blindly searching for a needle in a haystack. Jo Kunath is of the firm opinion that no recorder maker other than myself could have overcome these challenges.

Experimenting with the bass was too laborious and I switched to the tenor because it was easier to produce the prototypes. I was a beginner in 3D printing and the parts often failed to speak correctly - so I also worked in parallel with wood - which I knew better. I didn't have the benefit of a 3D milling machine, which works so precisely. However, working outside your comfort zone can be so exciting!

Further problems: The A's were puzzling, because the octave is often too narrow or the finger hole too large. Hole 7 also posed problems: Some notes (high and low) were refusing to speak and the only possible solution required making the instrument body thicker. Although it made construction a little trickier, the addition of a small platform at this hole provides a nice support for the little finger.

Sound and Appearance

The sound is the standard baroque style. Despite the complex inner structure, sigo has the familiar sound and is designed to be played with normal fingerings. Ergonomics and functionality have determined much of the appearance. The bore shape of the instrument made a thumb rest a good addition. The knick is a 'must' for the bass and a 'nice to have' for the tenor. The connection between the head joint and body is sleek and has a splash of colour. Like all innovative models, the instrument has found a unique design :-). It has, over the weeks, become quite familiar and pleasing to look at. The end of the bore is located on the back of the instrument, and its unusual shape has led me to lovingly nickname it the 'coin slot'. Its position means that you can even cover it with your thumb and play additional fingerings.

Production

By June 2024, I had made significant progress on the tenor design, although the bass remained a long way off. I wanted to finish my 'last project'; the innovative sizing could improve the accessibility of our instrument for children and adults. Whilst creation and bore design was my passion, I felt I could use support in fabricating the final design and bringing it onto the market.

So I showed the prototypes to companies, teachers and players, and looked for a manufacturer. Everyone thought it was great, but they were also a bit perplexed... Jo Kunath, however, immediately jumped at the project. His Paetzold recorders also feature intriguing bore shapes. The team boasts both 3D printing experts and modern machinery, so it all fitted!

The one thing that slowed us down during the collaboration was the German postal service. Some parcels were sent wandering around Germany and prevented us from making progress.

Meanwhile the bass was still not working. Steven milled even more extreme bore shapes. The thin walls troubled him at first, but he really knows his stuff and in the end he got it just right!

On 01.09.24 my girlfriend Susanna's mother died at the age of 101 and at the same time the first playable bass was created. But I hadn't reached my goal yet. The next iteration showed even more promise, so by the end of September it was looking quite positive. Jo wanted to finish the tenor by

the end of the year, so the team moved focus back to this model. They refined the appearance and optimised it to meet production requirements.

The production is anything but easy. I certainly can't get it to work on my 3D printer. Whilst Sibó is fortunately very experienced, it posed a real challenge for him too. With the head joint, we reached the limits of FDM (fused filament printing) and moved to SLA (resin printing), which creates a more stable and smoother product. Another step into the unfamiliar, yet we welcomed the challenge :-)
A few years ago, with the support of the German government, Kunath developed its own plant-based material for 3D printing. It is called RESONA and its instruments sound similar to those made from rosewood. As it has already been thoroughly tested and approved, it could immediately be used to produce the **sigó** series. Other plant-based materials are used in addition to RESONA. Although wood naturally looks great, there is only so much we can do using the printers. Besides, I also particularly like that Kunath's machines are powered by the solar panels on their roof. At night, the 3D printers can even work with stored solar power. How cool!

After just 4 months of collaboration, the tenor was presented in London. What incredible speed!

Pedagogy

I have never liked the high recorders. They really are an octave too high. The tenor recorder is actually at the soprano pitch- in comparison to flutes and other instruments. Many people feel the same way I do. Now beginners and children too can choose between the tenor and soprano.

Naturally, starting with an alto recorder is also a good option if you are able to manage the different fingerings. The **sigó** alto is in the pipeline. The finger holes will be even closer together than on a soprano. My first model was the bass, so I hope that it will soon be in production. It has become a little more elaborate and currently features a double key.

When playing in ensembles, alto, tenor and bass is a beautiful instrument combination for both kids and adults. Current teaching methods and music books can continue to be used, or easily adapted, and new ones will always be welcomed. And last but not least: the teachers' ears are pleased because the reduction of higher frequencies creates a less harsh sound.

Future Projects

For now, the current projects provide plenty of work. I don't have any further ideas about new developments at the moment.

- A **sigó** tenor in A or B could be interesting, but other bore shapes would be impractical
- The issue of dynamics has been neatly solved with my other recorders with dynamic short beak
- The volume of recorders is of course rather weak, but pleasant :-)
Commercial pickups don't convince me, I could continue working on that...
- An adjustable block was created as a happy accident whilst working on **sigó**. With it players could adjust the sound themselves, which is certainly interesting
- I'm retired and thank God I don't have to do anything any more :-)

Conclusion

I am of the opinion that the world of recorder making is about to experience a very exciting change: all thanks to the **sigó** :-)

Geri Bollinger
Recorder Designer

