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Kai-Thomas Roth and Fridolin Rusch work on the arching of a cello back at the Royal Scottish Academy of Music and Drama

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Making a Cello in five days based on a Gasparo da Salò model

Helen Michetschläger reports on teamwork in Glasgow

Over the last few years the Royal Scottish Academy of Music and Drama in Glasgow has run an ambitious project under the aegis of the Head of Strings, Peter Lissauer. A team of violin makers has been invited each summer to build an instrument at the Academy which, when finished, would become part of the Academy's loan collection for students. This was the final year of six, when a cello would be made to complete the set comprising two violins, two violas and two cellos. As on several previous occasions, Kai-Thomas Roth led the project. He selected, as the model, a Gasparo da Salò cello from circa 1580 which belongs to Vivien Mackie, a cellist living in Glasgow. This came with the bonus that the cello was available to us for the entire time we were working on the project.

The cello

The Gasparo cello is a fascinating instrument. There are only about half a dozen cellos by Gasparo in existence so a chance to see one comes rarely. The origins of this instrument are unclear. The back length, at 753mm, is fairly standard but it has been cut down in width. Typically this cello has double purfling and ornaments on the back on the upper and lower bouts. By reconstructing these purfling ornaments to match other Gasparo examples, we could estimate the original back widths as 371mm across the upper bouts and 474mm across the lower bouts – wider in the lower bouts than even the most generously proportioned models by Montagnana, but a more playable design as the upper bouts are less broad.

The belly of the cello looked to be a later replacement, in a reasonably convincing style. John Topham subsequently undertook a dendrochronological assessment which confirmed this; the youngest annual ring dated from 1687 and the chronology fitted with wood used by Italian makers including several Cremonese. The magnificent head, with its bold single flute, has a long pegbox with two filled pegholes indicating that it had once belonged to a six stringed instrument, probably a viol. Although clearly a Gasparo head, we could not know if it had started life on this instrument.

Organising the project

The time schedule for making the cello was tight – just five days to complete the cello in the white! The group was to be Kai himself, Marc Soubeyran, Verena Schauer, Manfred Rusch, Fridolin Rusch, Neil Ertz (for the first day only) and me. As the start date drew near, Kai circulated a detailed time plan of all the work to be undertaken and there were several telephone discussions about the details. What really impressed me, as

a new member of the team, was the willingness of all the other members to try new ideas and working methods. All my questions were about how we were going to do the purfling; it seemed a great opportunity for us to discover together how best to tackle the tricky but authentic technique of using separate strips of ebony and boxwood. The other big amendment to the plans came from Fridolin, who suggested that we try his working methods which include fitting the neck with only the front glued to the ribs. This would be key to the project as it gave us an extra day to complete the back with all its decoration. So I arrived in Glasgow happy that we had chosen working methods that would give us the maximum opportunity to learn new things. I anticipated a challenging and inspiring five days.

Day 1
Kai and Marc had spent the previous afternoon setting up a most impressive workshop in the large drama studio that we had been allocated at RSAMD. They had brought two large workbenches and it seemed as if the contents of their entire workshops had come too. No tool had been forgotten, nothing needed to be improvised. There was a lovely semi-slab one-piece back, a jointed front and the neck block cut out. We were not using a mould but Fridolin's technique of a double-cross shaped frame connecting the blocks.

Work started at a feverish pace and everyone seemed to know what to do with the minimum of direction from Kai. Fridolin had suggested that we part-hollowed the back and front before the outline was determined or the arching begun, so he, Kai, Marc and Manfred set to work with impressive speed and vigour, using their "Schropphobel" – large wooden scrub planes (see front cover). Fridolin explained to me that you could work quite safely, checking with a caliper that there was still a good thickness in the centre of the plate, and using your eye and the shape of the plane to keep an appropriate internal shape. Once this was done, the outline was cut out oversize and a preliminary edge thickness cut with a router. Then the planes came out again, in varying sizes, to rough out the arching. It seemed that three men could work on the back or front together, synchronising their strokes so as not to collide.

In the meantime Neil was busy with the rib assembly, aided by Kai and me. By the end of the first day the ribs were glued in place and Marc had fitted both sets of linings. Manfred made the fingerboard and Verena started work on the scroll; she and I decided to do one side each, so that we would effortlessly match the asymmetry of the original cello. It was such fun to work on this fantastic scroll with the real instrument by our side and the time pressure provided the ideal impetus to achieve the unfussy decisiveness of the original.

Day 2
The rib structure was levelled fast by Manfred using a huge sanding board. Verena finished off the scroll, cutting the lovely single flute round the head, which blends to a flat on the back of the pegbox. After some discussion with Kai and reference to photos of another original Gasparo cello, she made an appropriate recreation of the chin, improving on the shape left by restorers who had undertaken the neck graft. After a rough pre-shaping of the neck, the fingerboard was glued on. In no time the front arching was finished and scraped, and the front thickness taken down to about 8 or 10 mm. I then cut out the f holes using hole cutters and my deep-throated fretsaw. It was not much later in the day that the thicknessing was finished. I could then complete the cutting of the f-holes, passing the front to Marc to fit the bass bar which he did so quickly that we hardly saw it being done.

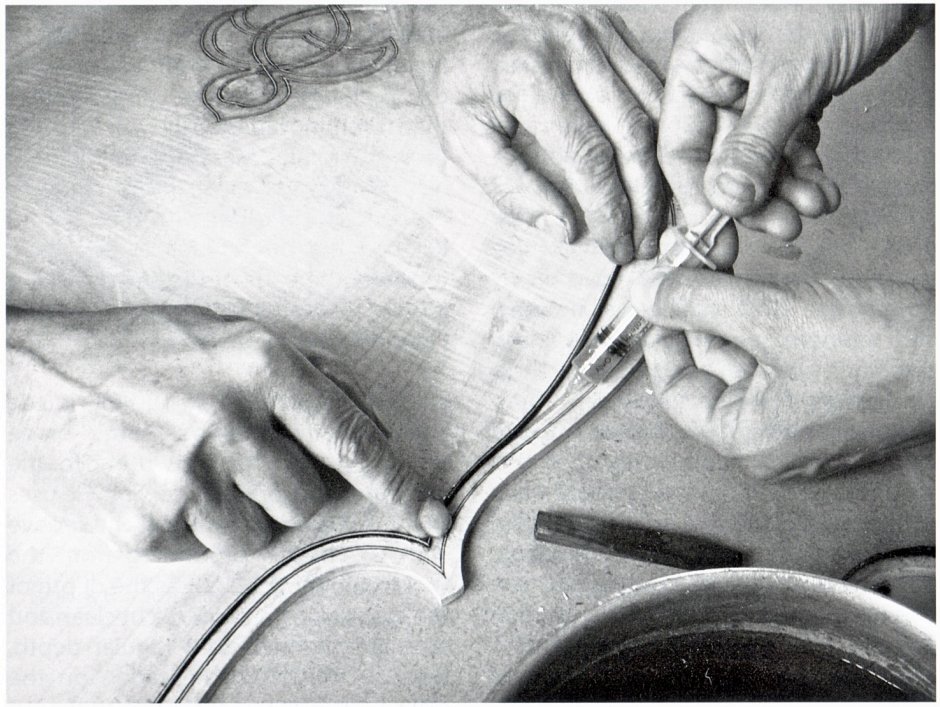
Kai, meanwhile, finished the back outline and, with Fridolin, finalised the arching shape ready for purfling. This was where, for me, the project became really exciting. I had already completed a lot of work using separate-strip purfling techniques. It is clear that the original Brescian instruments were done in this way and the technique allows the purfling to bend easily around the tight curves of the ornamentation. A lovely intense black is achieved from the ebony and a gleaming creamy white from the box (the original whites were actually spindle wood but as we did not have any to hand, box made a good substitute). I felt that I had not yet come up with the best way of tackling the process but, as I anticipated, each member of the team brought their own insights. By the time the purfling was finished, we had developed and improved the technique beyond all recognition. The first improvement was the preparation of the strips. Rather than trimming laboriously with a cutting gauge and knife, Marc had simply fitted his 0.6mm wide meat-slicing blade to his bandsaw and cut with that. Result! Kai had the bright idea to spot-glue together the ends of the strips making it (perhaps inauthentically) much easier to cut the mitres.

We cut the first line of purfling in the back using Fridolin's single-blade purfling cutters. He has two, one for the inner and one for the outer line. He uses them to both mark and cut the groove with the blades protruding from the tool to the same height as the depth of the cut, making it quick to cut clean and accurate channels to a regular depth. With so much ornamentation on the cello, everyone had a chance to try out these unfamiliar techniques.

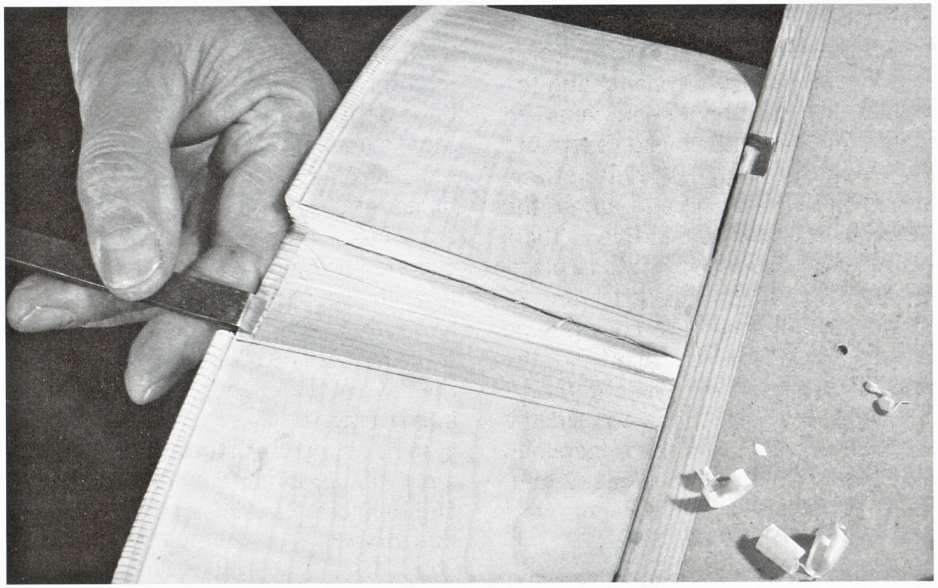
Kai had made full-size photocopies of the ornaments and I had spent some time on the first day reconstructing the central part that had been removed when the instrument had been cut down, a whole 11mm. We pasted these patterns to the back and dried the glue instantly with a hairdryer. Then, with the back cramped firmly in place, Kai and I could start work on one of the ornaments each. We cut one line freehand with a knife, following the pattern, then used the blade part of a double-bladed purfling tool to mark the second line which was then deepened with a knife. So by the time our 12-hour working day ended the ornaments were cut.

Day 3

It was a surprisingly straightforward job to fit the purfling in the ornaments. This huge design was a great deal less fiddly than some other Brescian ornaments I had tackled in the past and the spot-glued ends made for easier joints. I then fitted the purfling in the outer channel, passing it to the next person to fit the second row. It was fascinating to see how each person took stock of how the previous one had undertaken their work and then made their own improvements. I was impressed to see Fred cutting the butt joints neatly with a nail clipper rather than knife or chisel and then using a syringe to put the glue into the channel, running the purfling



Fitting the purfling using a syringe to insert the glue



Fridolin cutting the mortice for the neck

straight in after the glue so that the channel had no time to swell. Getting the channel width right seemed to be our major problem – with separate strips there is always the risk of one not bedding in if the channel is too narrow. It felt that we should have made the channel fractionally wider than we would have done for pre-glued strips.

Meanwhile, Marc shaped the bass bar and then Fridolin glued the front to the ribs. A new technique for me was seeing Marc shrinking the front with a heat lamp – a sensible idea to help stabilise the cello and help to prevent seams opening in the subsequent changes in humidity, both in the UV cupboard and once the instrument is finished. Later in the day the front outline was finalised and the two rows of purfling fitted. Manfred fitted the pegs and then Verena and others finished the neck shape as much as was possible at this stage.

Day 4

We were keen to see the neck fitting procedure, which proved to be a virtuoso performance. Fridolin marked out the neck joint carefully; without the back on and with no button in the way, it was easy to line up the prepared neck root accurately on the ribs. He then cut close to the marked lines with a Japanese saw. The mortise was quickly trimmed so that the joint was good. As the back had yet to be glued on, he could cut in either direction to follow the grain of the block, and could also check the fit from both sides. It took less than an hour to reach a perfect fit with alignment and elevation correct. This done, the measurements for the depth of the root and the shape

of the button were transferred to the neck and its shaping was almost totally finished before the neck was glued in. The neck was cramped from the root into the hole in the rib former that had also done duty when the ribs were glued to the top block. While the glue dried, we finished the back fluting and blended it into the arching, filling any gaps in the purfling with a thick paste of ebony dust and hide glue. In the one or two spots where one of the lines of black was missing from the channel, we simply scored with a knife where the line should have been, then filled it with our ebony filler. Then we finished the back thicknessing and prepared to glue it to the ribs.

Verena finishing the neck root

The tricky part of this neck-fitting technique came once it was time to take the ribs off the former. Manfred had already part-shaped the inside surfaces of the blocks and linings and it required a degree of care to separate the blocks from the former without splitting the blocks themselves. It also required a thorough check to see if any of the joint of the front and the ribs had opened in the process. Then, of course, the inside surface of the blocks had to be finished without skidding edge tools into the soft wood of the front.

The final job of the day was to plane the back of the neck root flush with the top block so that there would be a perfect joint with the button, and then to glue the back on. The length of the ribs, as they fit onto the back, governs the neck elevation. So Fridolin dry-cramped the back in place, checked that he was happy with the elevation, and drilled holes for locating pins. To glue the button area Fridolin made a neat cramping block for the fingerboard with a slot to allow the elevation gauge to slide through, so that the checking process was calm and straightforward.
It was a fantastic feeling when the back was glued on and the whole instrument came together.

Day 5

All that remained on the final day was to complete the set-up. Kai, Fridolin and Manfred finished off the ebony and Kai fitted the soundpost. While Marc was cutting one of his trademark bridges, Verena and I finished the edgework; working with knives and planes was fast and gave just the right look. The magic moment came when we were stringing up the cello. As Kai put on the strings, I held the bridge in place. Vivien Mackie was playing the original Gasparo and I felt the new cello vibrating in sympathy. After it was strung, Vivien, followed by Martin Storey (principal cellist of the BBCSSO) and baroque cellist Alison McGillivray, each played the new cello. It soon became apparent that the instrument really worked, with a characterful, noble sound and a particularly expressive A. Rather than the bland "committee instrument" which I feared we might have made, it seemed as if the close bond we had forged over the five days had created a sound that encapsulated the personalities and temperaments of all its makers.

Vivien Mackie playing the original Gasparo da Salò cello as Helen and Manfred clean up the new one