Cello rib doubling

A specialised method for reinforcing an instrument's ribs using silk and a vacuum bag

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NOTE When using a vacuum bag, there is a chance of glue and water on the inside of the rib being sucked right through by the vacuum, and of water damaging the finish (particularly with shellac varnishes). For this reason I recommend using fish glue, which is much more viscous than hot hide glue, and try a small test piece on an inconspicuous part of the rib . Also, don't leave the newly glued laminate in the vacuum bag longer than needed to tack the parts together; let it dry in the mould outside the vacuum bag.

If an instrument's ribs are too thin, or have many cracks, the traditional repair is to 'double' the rib: to fit a maple veneer inside the old rib to reinforce it. I have made several modifications to the traditional process which I believe give a better result.

- Counterforms are used to support the old rib while a reinforcing veneer is pressed and glued into the inside. Traditionally these are made of wood, hand-fitted to the outside of the rib, but this is laborious and ultimately not very accurate; undulations tend to get pressed out, giving the repaired rib an unnaturally flat look. I cast the counterforms from plaster, a much quicker process which preserves all of the detail of the original rib.
- The veneer is usually pressed into place using a second, internal, wooden counterform and many steel C-clamps. Instead I use a vacuum bag, as favoured in modern furniture veneering. It requires less set-up time and gives greater and more even pressure on the laminates.
- I use fish glue, a natural protein that has all the strength and conservative properties of hot hide glue but is liquid at room temperature and hence has a longer working time.
- Adding a layer of silk between the two maple layers significantly strengthens the laminate, allowing the rib to be thinner and more flexible. To see a video showing the reinforcing properties of silk, visit bit.ly/21W4QeG

Making a shield from masking tape

1 Taking casts from the cello ribs

I begin by making a shield for the original rib, using 1.5-inch wide, low-tack masking tape. If I suspect that the varnish is water-sensitive, I add a layer of packing tape. Then I lightly coat the tape with mineral oil for further water resistance and easy release from the mould.

Layers of burlap are used to add the plaster

2 I mix a small batch of plaster, wait until it starts to set, and trowel a thin (c.10mm) layer of plaster on to the rib. I allow this to set for about 15 minutes and then mix a larger batch of plaster. Again I wait for it to start to set, and then put three or four layers of plaster-impregnated burlap to the first layer. Making the mould is very like making a plaster cast for a broken arm.. ▷

ALL PHOTOS ANDREW CARRUTHERS

Making the plaster smooth all round

3 Using the remaining plaster and a trowel, I go round the outer surface of the mould until it is smooth.

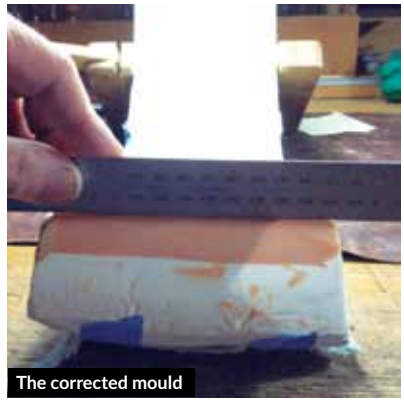
Removing the plaster cast

4 As the plaster begins to set, it heats up. This is the time to remove the mould. The resulting cast is very strong – I whacked a test one down on to the workbench and while it cracked in the middle, the embedded burlap held the two halves in place, perfectly aligned.

This rib must be flattened at the corner recurve

5 Although the aim is to preserve the natural shape of the rib, including the waves and undulations characteristic of an old rib, some corrections may be needed. For example, on this rib the corner recurve needs flattening so that it can be properly joined to the corner-block.

The new plaster is scraped before hardening



The corrected mould

6 To make corrections to the mould, high areas can be scraped while low areas must be filled with more plaster. I mix a small batch of the same plaster, and wet the mould before applying it. Scraping the new plaster while it is still 'green' will ensure a smooth transition between old and new layers. Adding a different colour to each subsequent layer is a good way to make sure that only the new plaster will be reshaped.

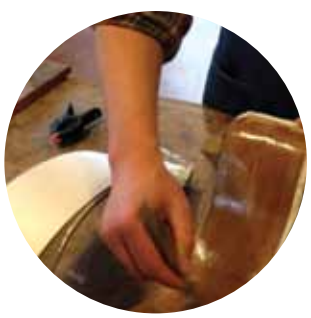

An internal counterform is made from card

7 An internal counterform will be needed to hold the newly laminated rib for a week or so while it dries. To make the internal counterform, I take four layers of book board, glue them together with Titebond, place them inside the plaster mould, and put the whole shebang into a vacuum bag. The resulting counterform is quite stiff and has all the undulations of the original rib.

To keep the rib from sticking to the plaster mould or getting scratched, during vacuuming I apply a low-tack adhesive vinyl, obtained from a sign-printing shop.


Adding wooden stops and alignment marks

8 I glue wooden stops to the plaster and add some alignment marks in pencil. These will be visible through the vacuum bag to ensure correct positioning of the rib in the mould.


Applying the fish glue


A layer of silk is added

9 For gluing large areas like this, I prefer to use fish glue, which is liquid at room temperature and has a much longer working time than hot glue.

I apply fish glue to the rib, followed by a sheet of silk. More glue is applied to the silk and the excess squeegeed off. Then comes the new maple veneer.


Everything goes into the vacuum bag for drying

10 With the doubling located, I put the whole thing into the vacuum bag. I leave it for two hours, long enough for the layers to be sucked close and for the glue to tack up. Everything is then removed from the vacuum bag and I clamp the cardboard counterform into place. It is then set aside to dry. Finally, once it has dried thoroughly, the new maple is thinned down to give the rib normal dimensions and flexibility.

For the cello repair depicted above, I was working with ribs that had been removed from the cello. However, I believe that the same method could be used effectively with the ribs in place on the back of the instrument. The final clamping would be done using many traditional C-clamps, rather than the vacuum bag.

NEXT ISSUE
Guy Cole on creating specialist tools for double bass making