Violin Maker
David Gusset

Text and Photos by Ellen Hansen

David Gusset's accomplishments as a violin maker are impressive. On his web page, the following entry heads the list of his Awards and Honors: First Prize/Gold Medal for violin making at the 1985 “Antonio Stradivari” International Triennial Violin Making competition in Cremona, Italy. Instrument acquired for permanent display in the Antonio Stradivari Museum in Cremona, Italy. (First prize out of 212 violins from thirty-one countries...the only American to ever win this honor.)

Other medals he's received include three gold medals in international violin making competitions sponsored by the Violin Society of America, the Simone F. Sacconi Award in Cremona Italy for "the instrument most representative of the classical Cremonese ideals," and prizes in German and French international violin making competitions.

In person, David Gusset is tall and thin, with a head of hair like Art Garfunkel's. He is soft-spoken, and serious, but catch his eye and you'll see the twinkle indicating a joke and ready smile are just below the surface. David is a regular fixture at the annual Westwind music and dance camp on the Oregon coast, where he hunts down new Scandinavian tunes, and joins jam sessions of most any genre. I recently had the chance to interview David at his violin shop in Eugene, Oregon. It was like stepping back in time. To get to his shop, go behind the 1870 Gothic Revival house he's in the midst of restoring (all wood, with vertical board and batten siding, listed on the National Register of Historic Places), wend your way through an overgrown meadow/garden, and you'll arrive at what used to be a carriage house. "About the only thing keeping it together when I bought the place was blackberry vines," quips David. But step inside the renovated building now, and you're in a cozy, old-world luthier's shop. Violins and violas for sale or awaiting repair hang high up on one wall. The workbench near the small north windows is filled with knives, gouges, planes, chisels, and various fiddle parts and pieces. A band saw, a freestanding workbench, and chests of drawers housing other violin making supplies and shop drawings fill the room. David is at work, planing a violin top.

The Making of a Violin Maker

What came first for you — playing the fiddle, or building violins?

I've played the violin since I was six. I took lessons for a number of years, then quit and took up other instruments, including the guitar, piano, and saxophone. I picked up the violin again sometime in high school, wanting to play fiddle music. I started listening to records, trying to learn by ear. I loved the instrument from the start: my mother remembers me telling her I wanted to make violins someday, but I don't remember that.

Where did you study violin making?

I began as a student of Paul Hart at Peter Preer's Violin Making School in Salt Lake City in 1974. Peter Prier was a graduate of the Mittenwald Violin Making School [in Bavaria, Germany], and after working for various violin shops in Europe, he came to work for a music store in Salt Lake City. Peter later went into business on his own, and started taking in apprentices in 1972, establishing the first violin making school in the United States. I was one of the first graduates.

So you learned the practical skills there, but in proceeding with your own violin making, you kept studying the masters?

Yes, in violin making school you learn the very basics of how to make violins: how to carve, shape and assemble the parts, how to mix glue and varnishes, how to use and sharpen tools. That program lasted two and a half years, but I'm still learning, thirty years later.

And after graduating from the violin making school?

I worked in Peter's repair shop that summer, and then took a job with a more well known shop in San Francisco: Frank Passa Viols. Frank was a pupil of Simone Sacconi, a very talented violin maker from Italy. Sacconi had worked for various makers in Italy, then came to New York City to work in Emil Herrmann's Violin Shop. When Herrmann's closed he moved over to Rembert Wurlitzer's, which was the biggest violin shop in the country, and probably the most important. Hundreds of Strads, Guarneris, and other big name instruments that are around today, passed through that shop, and were restored or sold there. Sacconi and his shop
helped develop many of the modern techniques of restoration that are still being used today. About a dozen pupils of his spread out across the United States, and Frank was one of them.

Frank was a knowledgeable dealer. So working for Frank, we generally had very good instruments coming through the shop to work on, improve or maintain. Dealers can make a good living — buying nice old instruments, fixing them up, and selling them for a lot more money! A lot of that work involved correcting the setup in order to bring an instrument up to its maximum potential.

*Where do dealers get the instruments they sell in their shops?*

They buy them from private parties or at auctions, take them in on trade or consignment. Often, people bring in instruments that have been in the family for generations and aren’t being played. Things just show up.

*Have you come into some instruments that way?*

Yes. I sometimes buy instruments or take them in on trade or consignment. The seller names a price, and if I think it has potential and I can afford it, I might buy it. Often, I take instruments on consignment, or I’ll find a buyer among my colleagues. There was an estate last year with twenty-one instruments; it wasn’t anything I could afford, but I was able to find a dealer to buy them all.

*When did you open your own shop?*

I have been working on my own since 1979.

*In making your own instruments, do you adhere to the Italian school of violin making?*

I mostly study the makers who worked in Cremona, Italy from the mid-1500s through the mid-1700s. That period is called the “Amati School.” Other Italian centers of violin making I’m interested in are Venice, Milan, Turin, Mantua, and Naples.

*Are Strads and Guarneri the models you mostly work with?*

Yes, mostly Stradivari and Guarneri, although I occasionally make others. I’ve made Amati model violas and cellos, and here’s my copy of a Sanctus Seraphin, a Venetian maker in the early 1700s. The associate concertmaster of the San Francisco Symphony commissioned this copy in 1980. She owned the original Seraphin — once owned by the violinist Efrem Zimbalist — but needed an instrument she could take on tour and play in the outdoor summer concerts. She’s since retired, and I have my instrument back on consignment. I also make copies of a fine Milanese viola that was in the shop — a Mantegazza. The model works well for clients who want a smaller viola with a unique voice.

The design for the most recent viola I’m making is essentially from a viola by Tomaso Balestrieri. This viola has a very classical, Cremonese look to it, almost Amati School, although Balestrieri was working in Mantua around the late 1700s.

*How would you describe a Cremonese look?*

It’s a system of geometric design, proportion, modeling, and architecture common to the early Cremonese instruments. Looking at a Cremonese violin, you immediately notice the pleasing curves and balanced proportions. Amati, Guarneri, Stradivari, Ruggeri, and Bergonzzi — they all used the same basic method of design, although each added their own variations.

*How do you go about using an instrument as a model?*

Take this Balestrieri. First, I analyze the outlines of its rib structure, back and top, and the placement of the f-holes. On a Cremonese instrument, the rib structure is built around a form [or mold] and the form is the geometry of the instrument. Here’s an overlay of his f-holes, and see this inside line? That’s the tracing of the rib structure. So this is how I think he may have designed his instrument. He created a proportional center that was 6 parts from the top edge and 7 parts from the bottom. The centers of the upper lobes [circular holes] of the f-hole falls on this curve, and the lower lobes fall on this arc; both are set measurements from the proportional center. Two interlocking circles form the upper bout and the two interlocking circles in the bottom bout form a common figure known to ancient Greek mathematicians as the “fish bladder” — the circumference of one circle passes through the center of the other circle. So I took the geometry of this instrument...

*How did you get its geometry — by taking it apart?*

No. I just traced the outlines onto paper and analyzed the curves. With a compass, you can find the centers of the arcs, and it turns
out they’re all related to each other, and also to the placement of the f-holes. I wanted to make a smaller viola, so once I’d worked out Balestrieri’s geometry on paper, I reduced the size of the model simply by changing the spacing of the legs of my measuring dividers. I also changed a few minor details — the curvature here of the corners, making them not quite so tight, to give more of an Amati feel, a more gentle feel. And I put Amati f-holes on it, and an Amati scroll. That’s my pattern for a viola. So I started with one instrument’s design, took its basic geometry and proportion, reduced its size, then modified it by doing things in the Amati style.

You could do this kind of geometrical drawing for any instrument?

I try, often. Most great makers of the past, especially the early Italians, worked out designs for each of their instrument models. I’ve recently been studying the outlines of Stradivari cellos. Here are several outlines — each one a bit different. How do you decide what the right curve is? When I am designing a form, all these curves are very important, how you end up with them. It makes a huge difference in the sound.

The Craft of Violin Making

Can you talk a bit about roughing out the plates — the top and back pieces of a fiddle?

Here, this is what the arch looks like when I’m rough carving the plate. I carve the outsides of the plates first, with a gouge working from the sides, cutting across the grain in parallel strokes, checking the symmetry now and again. I want the arch to have a certain shape to it: on the top it’s called a saddle arch; on the back, a parabolic arch.

It looks like you have both tops and backs in progress here.

Yes, see the difference? Here’s a back [showing me a plate with pencil lines, resembling a topographical map]. Viewed from the side, the back arch curve is more of a parabola, with one definite high spot. It’s full, but it’s always descending until it gets to here, and then it actually reverses. In other words, it’s convex in the center, and then at the edges, it’s concave.

The saddle arch here [on a top plate] is long and straight; it’s called a saddle arch, but it doesn’t really dip in the middle. The cell fibers of the wood run lengthwise. That straight arch and the long fibers makes the top plate strong and flexible, allowing it to vibrate efficiently with little loss of energy.

And which model is this?

This is a Strad. See this flatness in the middle [of the top plate] when you look at it from the side? It all has to do with the way the wood vibrates.

Can you talk a bit about that, the physics of how a fiddle works?

Sure. The vibrating plates of a violin set up a chain reaction of air molecules bouncing off each other and radiating out. That agitation of molecules in air is how sound travels, and when part of that disturbance reaches our ears, the brain interprets it as sound.

When you bow a violin, the rosined horsehair is actually grabbing the string and releasing it hundreds of times a second. On an open A string, it does that 440 times per second; that’s “A-440.” The bridge transforms that sideways movement [of the strings and the top of the bridge] into alternating up and down pulsations of the two bridge feet: when one foot is down the other is up, and vice versa.

This little platform between the f-holes that the bridge sits on has a certain freedom to rock from side to side. The centerline of the top arch acts as a pivot, allowing the sides to move up and down. Vibrations need to be sent efficiently to the larger surface areas of the top plate, which can agitate a greater number of air molecules.

And then there’s the bass bar — the long, narrow bar of spruce glued to the inside of the top plate, just to the bass side of the centerline. It looks similar to guitar bracing, but is not a brace at all; it’s actually a mute. Because it’s rigid, it helps mute vibrations happening this way [from upper to lower edges of the top], and allows lateral vibrations.

We have different archings for the top and the back because they have to vibrate in different ways. The back is more like the resonator of the instrument, it’s what reflects the sound. The back does not have the long straight arch in the middle. It mainly vibrates by moving in and out and has a pattern of graduated thicknesses with its thickest area in the proportional center. Graduations of the top are more uniform.
What work are you doing to [Scottish fiddler] Alasdair Fraser’s violin? It’s a bit like walking in on surgery, to see it opened up like that, with its top plate off.

I’ve glued and reinforced three small cracks. There were two small cracks up here, and one down here. Now I’m fitting and gluing in a new bass bar. After that I will be resetting the neck.

What will be the effect of a new bass bar?

Not much. Two of the cracks were adjacent to the bar, and they were easier to fix with the bass bar out of the way.

How would you describe the sound of the instrument you made for him?

I think it’s pretty warm-sounding. I don’t know — you should ask him, when he gets it back!

What sound do you typically try to achieve in an instrument?

I want an easily responsive instrument with a warm, rich sound. Sound is like a spectrum. I want a sound with a strong fundamental tone and a full, complex spectrum of overtones. What gives the shape or the quality to the note are the overtones. Any tone is going to have overtones, but a violin that works efficiently can produce more overtones, more sound and sweetness. Carrying power doesn’t mean loudness right under the musician’s ear. A full spectrum of overtones will carry the sound to the farthest corner of the concert hall. Talking about violin sound is like trying to describe the taste of a wine, you need a whole new vocabulary. People talk about focus, color, darkness, richness, warmth, sweetness — all those things. How do you really describe something so intangible?

I know, it’s very frustrating for me as a player. I know the sound I want in my dream fiddle, and think I actually heard it once on an instrument I tried at the FolkLife auction in Seattle. But the bidding went beyond my means. To try and describe that sound — I tend to think of it as a deep, warm, almost dark sound, but then not muddy, or lost, in the lower register… rather than a really bright, out-there kind of sound. I like the complexity of a warmer sound.

Dark and powerful at the same time can be a challenge.

How does that translate into how you make your instruments, to get the sound you’re after?

For the darker-sounding instruments, I make the Guarneri model. The architecture of that instrument is generally flatter, it’s lower, it’s not as high as the Strad model, and it has a little bit thicker graduations.

Do you consider the Strad model a brighter-sounding instrument?

The Strad sound has what they call a “silvery” quality, very satisfying but more soprano. It has warmth and richness, but the silver is this sort of penetrating warmth they have.

And Alasdair’s violin is based on the Strad model?

Yes — modeled in the style of Stradivari’s best period.

Can you say more about “response”?

Quick or easy response has to do with how efficiently the instrument is working. There really aren’t any straight lines in the violin, it’s all curves. It’s what you do with those curves: you use the curves for strength and to create a certain architecture of the instrument, and also specific flexibility. There’s both convexity and concavity in the back and top plates on a violin. The violin plate has to bend both ways, the arch has to bend out and it also has to bend in. You have to have just the right amount of each, and in the right places, to get that kind of efficiency of vibration.

Can you talk a bit more about the bridge? What kind of wood is used to make bridges?

It’s maple, very tight-grained, usually cut from the branches of a tree. It has to be cut from a perfect radius of that piece of wood. So you see these lines on the back side of the bridge, these long ones? Those are called the medullary rays, and they should run long on the backside. That gives the back a lot of strength, to help prevent warping. The bridge also has to support the strings; the curvature of the top is very important — it gives you bow clearance between the strings…

Except for old-timey players, who like a flatter bridge, right? Or Hardanger fiddlers…
Yeah, if you want to play all four strings at once! Normally, we use a 42 millimeter radius for that curvature, with notches for the strings set at about 11.5 millimeters apart, center to center. The G string side of the bridge is higher, because the G string needs more clearance over the fingerboard than the E string. We also give the fingerboard a tilt so it’s lower on the E string side than the G string side, because the steel E string is a much higher tension string.

That results in the bridge also being taller on the G string side and lower on the E. By lowering the E string, you decrease the downward pressure of that string. So by making the E string lower, the G string gains more power. A lower E string also makes it easier to play: you don’t have to reach your hand around as far on the neck, and you don’t have to raise your right arm so high to bow.

Like every other part of the violin, the bridge has to have just the right amount of strength, flexibility, and spring to it. It has to be flexible yet resilient.

And the position of the bridge on the top plate?

It’s between the f-holes. The little notches on the inside edge of the f-holes point toward the center of the bridge foot. And the bridge itself is located in the center of the violin in line with the fingerboard. For most instruments, it’s generally 19.5 centimeters from the instrument’s upper edge. On some old violins that are not really cut with any proper measurements, obviously some compromises have to be made.

And the bridge’s perpendicular placement?

The bridge is wedge-shaped. The back of a violin or viola bridge is flat, and should be standing 90 degrees to the table of the violin. The front of the violin bridge, which is the side that faces the fingerboard, is actually arched or rounded. The bridge looks delicate at the edge, but has strength in the middle.

What about the sound post?

The sound post [small dowel of spruce seen inside the treble f-hole] should never stand right under the bridge. It would take away the flexibility, that spring between bridge and post. It’s almost like a diving board. If you had something right underneath the board where you were diving from, it wouldn’t be able to spring up and down.

So what is the best placement of a sound post, and its purpose?

It helps transmit the energy from the top to the back, and then back to the top, bridge, and strings. The sound post is on the treble side, usually 2.5 or 3 millimeters behind the bridge foot, depending on the thicknesses and model of the instrument. You need that space between the sound post and the bridge, allowing that spring, so vibrations of the top and back won’t cancel each other out. And the sound post sits basically opposite the position of the bass bar.

If someone brings in an instrument to have you look at its setup, to try to improve the instrument, what types of things do you check for them?

I usually go through an instrument point by point: I check for cracks and loose seams, make sure the fingerboard is properly planed with the right curvatures, the nut and saddle are properly carved, and that the tailpiece is positioned correctly. There has to be the proper string length between the tailpiece and the bridge. That little section, even though you don’t bow it, is an important measurement.

Why is that?

Well, it needs to be a sympathetic length. It should be about one-sixth of the string length.

I check the setup: making sure the pegs work properly, seeing that the bridge is cut properly, or if it needs a new one. And sound post adjustments for tonal things. Often times, a player comes in with a buzzing instrument, and it’s because an edge has come loose and needs to be glued, or they have a crack, or little pieces of fuzz are caught in the f-hole! Things like that... so those are all basic adjustments. If the problem still isn’t solved and the instrument looks to be properly made, then I look at the inside of the instrument. And sometimes instruments have to be taken apart to be fixed.

Tools of the trade

How about a short tour of your shop — how things are laid out, and the types of tools you use in your violin making?

I have two main work benches: this is the one I sit at to work, and this is the one that I stand up to do large pieces — for joining, or planing. This is my bending iron: just a piece of metal, you put this over the hot plate and heat it up.

You make bows, too?

I don’t make bows anymore, though I made a few bows just after leaving Frank Passa’s shop in San Francisco. Frank wanted to start a bow making division in his shop, so I spent some time roughing out bow sticks while working there. I learned a great appreciation of bow making, but decided to concentrate on violin restoration over the bow work.

So what do you use the bending iron for?

This is for bending ribs [the sides of the violin], linings, and for the tight turns of the purfling [the inlay around the borders of the top and back plates]. Bows sticks are bent by heating the wood over the flame of an alcohol lamp. The heat has to penetrate all the way through the stick. It’s tricky heating one section of the bow at a time, moving the stick quickly over the flame, always moving and turning the stick so as not to scorch the wood. When wood is hot enough, it becomes pliable and can be bent. As it cools it sets up.

Do you use all hand tools, or do you have some power tools?

All are hand tools except for these: the band saw and the drill press. The band saw is my main tool for roughing out shapes. I use the drill press for the peg holes of the scroll. This is a scroll block: I square up three sides with a plane, trace my pattern onto one side, and mark the positions of the peg holes. I use the drill press to drill the holes where the pegs are going to be.
Can you describe some of the hand tools you use in the process of violin making?

The main tools I use are steel knives, gouges, chisels, planes, scrapers, files, and rasps. Here are three typical knives, and these all have to be razor sharp. This is my main knife, and this other knife I use for carving the f-holes. This one I use for carving bridges, for doing the little cutouts: it’s long and thin, and its backbone is rounded. It’s sharp, but the blade has a much more blunt bevel, more like a scraping tool.

Are these tools you’ve fashioned yourself?

The knives, yes. They’re steel, and you just make a wooden handle. The blade runs pretty much the length of this; as you sharpen this, the knife gets shorter and shorter. See this little mark here? That’s from the grinder when I was in violin making school. So it stays sharp a long time; it’s only lost half an inch in length in almost thirty years. I don’t ever regrind these tools — the grinder is only for reshaping things — I just take them to the hand stones to sharpen them.

What about the gouges?

I use this gouge for graduating the thickness of the plate: I can use one or two hands on the long wooden handle. The end of the handle is egg-shaped, so it fits nicely in the palm of my hand. I can use my other hand to guide and help put it in place before the start of a gouge stroke. Here is another common gouge that I use — it’s beveled on the inside, and used for shaping the corner blocks where the ribs fit on. Here are scroll gouges for carving the spiral and fluting of the scroll.

And chisels?

Yes, the chisels are flat for making straight cuts. And then there are planes. I use this hand-sized block plane the most, for doing small things. It was developed by butchers: because it has a very low angle, they used it for flattening their butcher blocks. Having that low angle helps it cut end grain pretty well.

And, of course, these big planes. This is a joining plane, and would be for joining a two-piece back or top.

That looks big — is that for larger instruments?

This will work for cello, but I also use it for violin. I usually put the plane into the vise upside down with the blade sticking up, and run my pieces of wood over the top of it. This is the biggest plane I have. And then I have little finger planes. Here’s the littlest guy: it has a slightly convex sole.

When would you use these?

See the inside of this plate, all those tool marks? This is not finished yet: I first used the gouge for roughing it, then I’ll move on to this plane, and then for some things, I might even use this little plane.

How do you check the thickness as you’re going along, or do you just have a feel for it after all these years?

You can flex small parts of the wood with your hands as you go. You also measure it. This tool reads thicknesses down to a tenth of a millimeter.

What’s this tool called?

It’s a graduation caliper for measuring the thicknesses of the plates as I’m working them: it’s a specialized tool for violin makers. Here’s another thicknessing tool — one side is adjustable, and the other side has a fixed pencil point. To decide where I want to start my...
scooping on the inside, I set the opening for a specific measure-
ment. I open the arms, enough to get it over the edge, and I make
my mark around here. After I’ve taken away some of the thickness
in between the pencil lines, I mark it again. I keep repeating that
process until I end up with a uniform thickness.

This is another tool that’s good for graduating violins. I clamp it
into the vise, and set the adjustable screw for the thickness I want.
It has a very sharp 3-sided point on one side, and a fixed point on
the other side. I take a plate that I’ve rough graduated using the
other tools, hold the plate in here, and make a series of punch marks.
Then I can take it back to my bench, and just plane away the punch
marks, until the hole disappears. I set it for 3 millimeters for a
violin top, and once I plane away all those marks, I know that the
whole top is at 3 millimeters, and that’s when I start flexing it,
carefully measuring it.

I’ve often wondered if you had to keep checking things all along
the way. These methods seem to really help, so you can be doing
the work and not checking it every other minute.

Exactly. Of course, you have to know your wood — I closely ex-
amine every piece of wood before I buy it. I know the quality of
wood I have and know that I can easily take the top wood down to
3 millimeters before I even start measuring.

Any other tools?

Files and rasps. The best rasps are handmade, like this one — see,
the teeth are each formed individually [unlike machine made], so
they’re not in perfect rows. When you’re rasping, if the teeth were
all perfectly lined up, you’d end up with burrows in your work.
With handmade rasps, because they’re not perfect, it comes out
smoother.

And then you finish with scraping. A scraper is basically just a thin
piece of steel that’s been shaped and rounded, and then the edge is
turned over. I sharpen the edge, and slightly turn the edge with a
burnisher, so the edge of the scraper has a little bit of hook — see
this edge here, how it’s reflecting the light, because it’s actually
bent over. You can make scrapers in all different shapes. And since
you have to keep sharpening these, you can change the shape when
you’re sharpening them.

And that’s for finishing the inside of the violin?

For finishing everything. But to polish after scraping, I use the
stalk of the Equisetum plant [also called horsetail or scouring rush].
I don’t use sandpaper for several reasons: it would round off deli-
cately-carved detail, it tends to dig deeper into the softer areas of a
piece of wood, and it leaves behind surface scratches and clogged
wood pores.

The Equisetum stalk is divided in sections and looks a little like
bamboo. I take one of those sections, slice it open, and then flatten
it out with a clothes iron. Then I apply an iron-on patch to the
inside to hold it together.

Why is horsetail good for finishing?

It has a little bit of silica in it, so it polishes, it burnishes.

And that’s for all over the instrument as well?

Yes. Traditional methods still work the best.

Woods

Where do you get your wood?

I go to Europe to buy my wood directly from the saw mills. Many
of those companies have been in business for generations just cut-
ting and seasoning wood for violin makers. I get spruce from the
Dolomite mountains, in northeastern Italy. The maple is from the
Bosnian Alps. I used to buy my maple in Germany from a Yugo-
slavian wood dealer there; he passed away a few years ago. Now,
I get it wherever I can. The last maple I’ve been working with, the
last twenty-five pieces or so, I bought from Frank before he passed
away. He got that wood in the 1950s when he left Wurlitzer’s in
New York.

Ideally, how long would you season wood before using it to make
an instrument?

About ten to fifteen years. But this Bosnian maple for the back
here is fifty years old. If I were to buy wood like that now, it might
cost $1,000 a back — just for a rough piece of wood. The spruce
I’m using is not that old: it’s wood I picked out in 1986, 1988, and
1990, but they’re all at least fifteen years old.

And the spruce is for the top of the violin?

Yes. And also for the bass bar and sound post. In the Guarneri
model, spruce is used for the blocks and the linings, too. The Strad
model [pointing to Alasdaire’s fiddle, a Strad model, opened on the
bench for repair], is made with willow blocks and linings. The
sides, and the back, and the scroll are all maple.

What wood do you use for the fittings?

The pegs, tailpiece, end pin, and chin rest are all the best hand-
made stained boxwood fittings from England.

And the fingerboard is ebony?

Yes, ebony for the fingerboard, nut, and saddle.

Where is the ebony from?

I think the ebony I have probably comes originally from Madagas-
car. The very best ebony used to come from the island of Mauritius.
That stuff disappeared about 100 years ago — the French took out
the last of that. You will see it on 19th century French bow frogs.

And the purfling?

The wood of the purfling is poplar and dyed pear woods. When
you look at the purfling inlay on a violin, you’re probably only
seeing two black lines, but there are actually three pieces of wood
there, two black and a light-colored one in between. Here is a chunk
of pear wood, and this is going to be the black. I use one of these low angle block planes, twelve-and-a half degrees, and sharpen the blade like a razor, then adjust the blade to make a thick shaving, about three-tenths of a millimeter thick. I put the pear wood in between the bench dogs on the workbench like this, wet the wood, and force the moisture deeper into the wood by steaming it with an electric clothes iron, run my plane over it, and a big curl of wood comes out.

Then the shaving has to be dyed, just like dyeing clothes. I use logwood, a dark red exotic wood that looks very similar to pernambuco. Combined with the mordants ferrous sulfate and copper sulfate, the shavings turn black.

How do you prepare the center strip?

The center is very light-colored poplar. Here's what I use the band saw for. I'll take this strip of wood after it comes off the saw and plane it down to about seven-tenths of a millimeter. And here's the pear wood after it's been dyed. So I just glue it up like a sandwich of two blacks with a white in between, and then cut thin strips of it.

These thin strips of purfling have enough flexibility that I won't have to use any heat for bending the broader curves for violins and cellos. But I will need to use the bending iron for bending the tighter turns around the C-bouts and corners.

How do you go about inlaying the purfling into the violin?

I have two purfling tools. One tool has two blades on it, and it marks the groove, scribing a pair of lines at a set distance from the edge. Next, I cut them to depth by making several passes with my sharpest knife. The other tool is a chisel in the shape of a tiny foot. It's for chopping out the part in between the two lines, leaving a groove the width of the purfling.

How do you maintain the same depth, as you're carving that out?

I can just feel with the knife. And working with the little chisel, it has a flat bottom, so it rests in the bottom of the groove. The edge of the violin is almost 4 millimeters thick at that stage, and the finished groove is slightly less than 2 millimeters deep, roughly half the thickness of the edge. Just experience.

Varnish

Can you talk a bit about varnish, and its importance? I noticed on your web site that you have some very interesting close-up shots of varnish layers.

Yes. There's a layer of the finish that is thicker than the varnish: it's called the mineral ground.

Varnish is extremely important. First of all, you carve all the pieces of wood that go into making a violin and everything is graduated and curved into the perfect shape and the perfect thicknesses to give you the right feel — it has to feel right in your hand, and you can hold it up to your ear and tap it, and hear it ring and resonate. You spend all this time fashioning pieces that go into making the violin, and so you don't want to put anything on the outside of the violin that's going to act like a straight jacket, or anything that's going to penetrate the wood and make the wood sound soggy. You want to preserve all the acoustical adjustments you've done to the wood. So the idea is to put on a layer that will beautify the wood, give it some life, some fire, a nice complex color, and yet it has to be so thin, but have the visual appearance of great depth.

That's where the number of layers of varnish comes in?

The layers actually spread out, and they're just very thin layers of material. There's a total of three or four layers of varnish on a violin, but it all amalgamates together and becomes one layer, but the layer itself is very, very, very thin. You can see on Alasdair's violin — here, where it's been worn and chipped away, how thin it is.

You want it to look like you can't even tell where the surface of the wood begins. You want to make it deceptive to the eye. But at the same time, you don't want to affect the acoustical properties of the wood. To learn how to do that, you have to go back in history and study the materials and techniques of the Renaissance painters. There are old manuscripts with recipes for varnishes, colors, and paints.

What's the purpose of the mineral ground?

The mineral ground keeps the varnish from penetrating into the wood. One way scientists classify minerals is by their index of light refraction: each mineral and material has its own index number depending on how it reflects and refracts light. To achieve a varnish with great visual depth and transparency, it is important to find a mineral that has the same light refractive index number as both the wood and varnish.

To show how the light refractive index works, if you take a piece of perfectly clear glass, and crush and grind it into a fine powder, it becomes totally white and opaque. You can no longer see through it — the light trying to pass through the powdered glass is being fragmented and refracted in all directions and so it just looks like white powder. But take that same white powder and throw it into a jar of water, and it suddenly disappears. The glass powder becomes invisible because water and glass have similar numbers on the light refractive index.

That's the same idea with the mineral ground. The mineral ground helps create that effect of depth and transparency, while at the same time sealing the pores of the wood. It keeps the varnish from soaking in; and if the varnish ever chips or wears off, it also protects the wood from dirt and stains.

What's in the mineral ground?

It's based on silica and alumina, which are two of the most common elements of the earth.

Do you make your own varnishes?

Yes. They're oil varnishes, oil and resin. I use linseed oil, which comes from the flax plant. I'm getting the oil now from northern Europe, from Sweden, and it seems to have better drying
properties and fewer impurities. Linseed oil has a certain amount of mucilage in it, and it has to be washed before it is usable. You combine raw linseed oil and distilled water in a jar, and shake it into a whitish foam. Then let it settle and separate. The oil floats to the top and the water goes to the bottom. After a few days, you drain the water out of the bottom, then add more water, and repeat the process. What you're doing is washing out the water soluble parts of the oil, mainly mucilage. What remains is the oil, which you then cook at really high temperatures.

And the resin?

The other main ingredient in varnish is resin. Generally, I use Venetian turpentine, or Strasbourg turpentine; one is from the larch tree and the other is from another conifer, maybe a fir tree. They take that resin, heat it, then capture what evaporates off and distill it, ending up with turpentine. As the distilled turpentine is exposed to air and ages, it oxidizes, becoming thick like honey. That is the form I buy it in. I cook that material down until it develops wonderful deep red-brown colors, like caramelizing sugar.

Do you sometimes add other colors?

Yes, for other colors I add lakes, which are organic pigments that are fixed to an inorganic pigment. Lakes I use are “robbia” made from madder root, “verzino” made from brazil wood shavings, and “carmina” made from cochineal. The lakes are made by fermenting the dyestuffs, putting them in an alkaline solution, and then adding the inorganic mineral, normally alum. When everything is combined, the lake precipitates out of the solution leaving clear water on top and something like sludge on the bottom of the jar. The sludge is the lake, and must then be rinsed several times in a filter and spread out to dry. Then it’s ground into a fine powder and added to the varnish.

If you were natural-dying clothes, you’d have all the same ingredients: potash for the alkaline solution, and madder root, alum. But you’d be fixing the color to the cloth. In making a lake, you’re not using the cloth, you’re just fixing the color to the mineral itself. And you end up with the sludge, the precipitate of that process, and you get these colors [he pulls out an apothecary chest drawer full of little jars of these precipitates]. Here’s verzino, here’s carmina — it looks rather purple, but when you put it with a golden brown varnish, you get more of a brown. Here’s another verzino, of a slightly different hue. Here’s a Windsor Newton madder lake — it looks pink, but when added to the varnish it’s actually red. Lamp black, soot from the stove, can be added to tone things down a little bit.

Some other interesting colors come from old world ingredients like dragon’s blood and gamboge, two somewhat translucent colored resins. Many mineral pigments won’t work because they are too opaque.

Can you talk a bit more about the translucence of varnish?

You grind up these lakes into oil of spike-lavender, and then add them to the varnish. But they’re actually little particles, little crystals floating in suspension within the varnish. This allows light to freely pass between the crystals on its way to and from the wood, maintaining the translucency of the varnish. But the light is also refracted in multiple directions by the colored crystals, adding more color intensity to the varnish layer.

The Artistry of Violin Making

What is your favorite part of violin making?

I like it all. It never gets boring. It takes so many different skills to make a fine violin. You have to be an architect, engineer, wood carver, tool maker, and varnish maker. And you need an artistic sensibility. It takes memory and intuition to keep improving. You have to remember what your last instruments were like, and be intuitively aware of what kind of changes to make on the next instrument.

So it's the synergy of all of it together...

Yes, and it’s helpful to be a musician. A good musician no longer has to deal with the mechanics of playing and can concentrate on the instrument’s tone. You need a good ear, and a good memory for sound and sound comparison. Working with customers can also be challenging, especially communicating about sound and response. Not all musicians know specifically what they are after, so it’s difficult to know how to help them.

Is there a particular instrument you’ve made over these past thirty years that you’re especially proud of, or parts that you want to remember and perhaps repeat?

I generally enjoy making every instrument. I spend so much time making each one — selecting a piece of wood that’s inspiring, and trying to make each instrument a finished piece of art. Obviously, some instruments have been more successful sound-wise than others. And I have a little bit of an attachment to some instruments. I like this one I made for Alasdair. One reason I like it is that he’s been on tour for fifteen years with it, and so it’s been in every climate of the world, often times making those seasonal and climate changes many times a year. It’s interesting to see how my instruments age and wear over fifteen years of constant use.

One last question: Would you describe the back of Alasdair’s instrument, and talk a bit about “flame”?

It’s a one-piece maple back; fairly tight-grained wood, medium-flamed with some interesting, slightly irregular flames. The wood fiber in a piece of flamed maple is like wavy hair. The flame (or curl) runs relatively perpendicular to the direction of the wood fiber. Fibers run the length of a piece of wood. But when you cut it, there are fibers going in and out, something like a corrugated roof. So when you look at it, you see light and dark stripes. After cutting and planing it, you end up with some of the ends of the fibers pointing towards your eye, and then some you’re seeing the side views of fibers. The dark is when you’re looking into the ends of the fibers, and the light you’re seeing the sides of the fibers. When you’re doing the varnishing, you want to accentuate that. You want to make the dark even darker and the light even lighter.

But you don’t want to stain it — that would kill the flame, and the flames wouldn’t jump. But here [rocking the back of Alasdair’s
Alasdair Fraser, on owning a David Gusset violin

“...I love having this relationship with the person who made the violin that I’ve spent so much time with. The violin was finished in 1991, the same year our first son was born, kind of a nice coincidence. And that violin has been everywhere with me. My touring schedule and the nature of music I play takes me into all kinds of venues, and all kinds of climate zones — from very humid to very dry, to the north of Scotland, to Spain, to the islands, to Arizona and Boston and New York in the summer — extreme humidity changes. And I wanted a really fine violin that I knew would be extremely well-made and robust and able to handle a modern touring schedule.

“I loved David’s work when I first met him. And I’ve really enjoyed the idea of me taking the violin out as we first agreed, with the spirit of giving it a good field test, really playing it a lot, in auditoriums, in fine concert halls including the Kennedy Center, and in other really beautiful acoustic spaces. And it’s played in many the bar, in pub sessions, and I use it for teaching in my courses on the Isle of Skye.

“And the nice thing about having an instrument from a living maker is that you can kind of take it in for a pit stop. Once a year I’d usually stop by David’s place in Oregon, and he would get to watch his violin age, and get to monitor how it responds to getting used a lot.

“...A violin is where form and function come together so beautifully. And a well-made violin has a much better chance of sounding good. [My] violin has a very even tone, and it feels wonderful, which is really important. [That’s] kind of an elusive, extra dimension — there’s the visual, the sonic, and, very important to me, that sense of comfort, that sense of playability. And I really haven’t found another violin that feels quite as playable, ever. It suits my hand, there’s no resistance, and the dimensions feel good. It suits me.

“...I was talking to David recently up in Portland, Oregon, and we [decided to give my violin] an extra-special pit stop: I was able to put in my request for little changes that I would enjoy, and David was gracious enough to go along with it. He just sent it to me — I haven’t tried it yet, I just took it out of the box ten minutes ago, and I’m really excited to try it. I’m about to pack up and head for San Diego and Scotland for a week, so I’m going to take the new fifteen-year-old violin on the road with me and give it a good workout. Then I’ll get back to David and let him know how it’s singing, how good it feels. I’m just so glad to have it back again.

“...[It all goes] hand in hand, the violin and its maker, the journey and the music. It suits the kind of grassroots way I like to approach music — it’s inclusive, you want to go back to the origins of the music and then make it soar. Take it on a journey. So I’m taking this violin on a journey again.”

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David Gusset’s violin shop is located at 1611 Lincoln Street, Eugene, Oregon 97401. He can be reached by telephone at (541) 342-2772 or by e-mail at <dgusset@gussetviolins.com>.

His web site <www.gussetviolins.com> is well worth a visit, especially for the scanning electron microscope images of mineral ground and varnish layers. The section on caring for your instrument is also quite informative, sharing tips from how to correctly adjust your bridge (lifting the tension of the strings off the bridge while gently adjusting the upper edge of the bridge) to how to best protect the varnish on your instrument (gently wipe off rosin dust after each use using a soft, clean cloth — don’t rub, as that could scratch the varnish; handle your instrument only by the neck and the bottom at the chin rest clamp or lower saddle).

A complete string quartet of David’s instruments will be on display from mid-June to mid-July 2006 as part of an exhibit at the Performing Arts Center in Eugene, Oregon.

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