

# Guitar Makers Create Beautiful Music with UV Coatings

By Angela Osborne

Guitar makers are master craftsmen, diligent and patient as they hone their craft to make the highest quality instruments. For two guitar manufacturers, that diligence and quest for perfection—not to mention adherence to increasingly strict environmental regulations—led them to try UV-curable finishes. What drew them to UV-curing technology and kept them searching for just the right UV product was ultimately the quality of the finish.

“Acrylate has a better appearance. It’s clearer and glossier than the polyester product we were using before,” says Tom Anderson, founder and owner of Tom Anderson Guitarworks in Newbury Park, Calif. “Over time, customers noticed the difference. I was surprised that people noticed. Even in our industry, people talk about our finish and say that it’s a really great finish.”

Bob Taylor, founder and owner of Taylor Guitars in El Cajon, Calif., concurs. “The durability is really incredible, too, now that we’ve found the right finishes,” he says.

## Why change?

Both guitar makers are known for their quality, yet each represents a different end of the production spectrum. Tom Anderson Guitarworks is a small, high-end, electric guitar manufacturer. They have 15 employees who make approximately 800 guitars a year, ranging in price from \$2,500 to \$4,000.

The company has been in business since 1984 and has seen steady growth, selling to retail stores and dealers in the United States as well as in Europe and Asia. About one-third of their products go overseas, and everything they build is made-to-order. Customers have included bands like the Rolling Stones, Eagles and Chicago as well as a lot of session players. “We don’t want to be much bigger than we are,” says Anderson. “This is a real comfortable size.



We’re not looking to be a real big manufacturer.”

Taylor Guitars started out in much the same way. Bob Taylor and Kurt Listug founded Taylor Guitars in 1974 as a small shop with only a handful of employees. Along the way, they combined Old World craftsmanship

with state-of-the-art technology to grow into a company with more than 250 employees producing more than 30,000 acoustic guitars a year, ranging in price from \$398 to \$9,838. Many well-known musical groups have used Taylor guitars, including Jewel, Hootie and the Blowfish, R.E.M., Pearl Jam, Bonnie Raitt, Fleetwood Mac, Garth Brooks and Aerosmith. Even President Clinton owns a Taylor guitar.

What both manufacturers have in common is a vision of the future. Before switching to UV curing in 1993, Anderson’s finishing work was done by an outside vendor.

The company wanted to bring that work in-house so it could control production quality and timing, but it didn’t want the smelly environment or the volatile organic compound (VOC) emissions of an in-house finishing shop.

Anderson also wanted a durable,

quality finish that dries fast—a finish that is fully cured when the product is shipped to retailers. “I think almost everybody who makes guitars buffs the paint before it’s

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**—Tom Anderson**

ready to be buffed because they need to get the guitars out the door," says Anderson. "With a conventional catalyst cure, most people sand and polish an instrument a day or two after it's painted. It's not really completely dry at that point so weeks later, after the product is in the store, the finish continues to shrink and it doesn't look good."

For Taylor, the urge to switch processes was led by air pollution district rulings. "The reason I went to UV and developed that, rather than going to waterborne finishes or something else, was the quality I thought I could get out of it and more efficient production/work times," says Taylor.

Taylor was also concerned about the durability of the finish. "Normally, over a period of time, the finish sinks into the pores of the wood," he says. "What starts out as a high gloss eventually sinks into the wood's pores and loses its luster. We don't have that trouble with UV. That's one quality advantage."

### Understanding the process

For both manufacturers, converting to UV finishing involved finding a product that would work within the confines of the woodworking process—a process which involves several layers of finish, sanding and polishing.

The biggest hurdle for applying UV-curable finishes is at the first step of the finishing process. "Some of the woods we use have a fair amount of air inside them," says Anderson. "When you try to UV cure finish on bare wood, the heat from the lamps makes the air come out of the wood creating bubbles in the finish."

For Taylor, the key to the whole process was finding a filler that would fill or seal the grain of the wood. "That one thing was the key to being able to spray anything on top of the wood," says Taylor. "You have to seal the wood first. That's why guitar manufacturers need a finish that will cure easily, is thin enough to go in but not so thick that it will continue migrating through the pores. It's just such a magic combination of things that have to work."

Finding that magic combination was no easy task. Taylor discovered that many available finishes had a lot of monomers in them in order to make them sprayable. "The finish is so thin that when you spray it on a thin piece of wood, it migrates into the wood. It sinks in," says Taylor. "It's very hard to cure finish once it's inside the pores because the light has to reach down in there. If it doesn't



Sanding between coats at Tom Anderson Guitarworks.

cure, then you're left with uncured finish in the wood. On a guitar, it can soak right through to the other side and ooze out into the inside of the guitar.

"Our product is very hard to finish," adds Taylor. "When you're finishing solid woods, it's a different ball game than finishing metal, plastics or laminate. Anybody who's finishing solid wood with a lacquer-style finish needs finishes that can be sanded easily between coats, that can go into the wood without continuing to migrate. The finish that works on solid wood isn't the same finish that works on parts made of metal, plastic, graphite, plywood or particle board. It's a different animal altogether. Manufacturers have to make a finish that will go on and flow in and yet stop at a depth that it can still be cured."

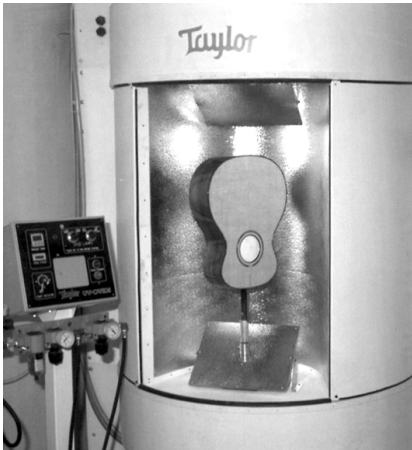
The holy grail of most finish designers is a "bulletproof" finish, according to Taylor. "I don't want a hard finish. I want something that is about as hard as lacquer or maybe a little bit harder," he says. "I want a soft finish."

### Implementation

Both guitar makers found that making the switch to UV-curable finishes took some time. "It was a bigger learning curve than we thought it would be," says Anderson. "It turned out, what we thought was a small problem going into the process turned out to be a really big problem."

The problem, of course, was sealing the wood. Anderson Guitarworks addressed the air bubble problem by developing a dual curing process using customized products. "We needed the finish thick enough to be sanded and polished," says Anderson. "We couldn't get enough 100% solids material on to be able to do that. That's why we ended up with an acrylate with some solvent in it."

Now, all of Anderson's guitars get a UV coating, although



Taylor Guitars' "UV oven"

the process has several different kinds of finish in it—it's not just one finish over bare wood. The guitar maker uses acrylate from Lilly Industries, polyester from Lawrence

McFadden and urethane colors from WLS Coatings.

Anderson conventionally cures the colors in the middle of the process because the colors cannot be UV cured. Their process includes (1) a dual cure sealer—catalyzed and UV cured; (2) an acrylic urethane color, which is not UV cured but is isocyanate cured; (3) a UV-cured polyester; and finally (4) UV-cured acrylate that gets sanded and polished. "We spray the finish on, catalyzed, and then after the finish is set we UV cure it the rest of the way," says Anderson.

The company spent a year perfecting the process before bringing it in-house in 1993 through a gradual transition. Initially, an outside vendor did the entire finish. Then Anderson began sealing and preparing the guitar body for color before sending it to the outside vendor for the color and topcoat work. They did that for several months. "Once that part was ironed out, the rest was easier," says Anderson. "By the end of the first year, we were completely in-house."

For Taylor Guitars, the transition process took four years to develop the right coating and processes. "We found the answers because we were relentless," says Taylor. "It was a purchasing game more than a developing game. A lot of people think that they're going to have finishes developed. That wasn't the case for us. Nobody could develop what we wanted."

Eventually, after talking to people at various UV finishing companies, Taylor found someone who "got what we were saying" and who directed them to an existing finishing product. Taylor had to refine the process, but they made it work. "It's very difficult to start nowhere, like we did, and make this work. I can show you in five minutes how to do it, but it took us four years to figure it out," says Taylor. "Just by our own trial and error and our own ingenuity, we took some coatings that people were making—for spraying, for example—and we turned them into fillers."

In addition to finding the right products, Taylor Guitars custom designed spray booths for spraying and curing the UV-curable finishes—oven systems that were specifically designed to generate less heat. "These lights kick off a lot of

heat. If we expose the guitar to heat for 20 seconds, it could ruin the guitar if it gets too hot. So we had to figure out ways to keep them really cool inside," says Taylor. "We used to get guitars coming out at 160° Fahrenheit—that's enough to make the glue joints fall apart or the parts of wood shrink. Now we get guitars out at under 100° Fahrenheit, which is fine."

### Perseverance pays off

Both manufacturers feel their efforts have paid off. The highest kudos are for the quality and long-lasting finish. "The UV finish is more durable," says Taylor. "We can put on thinner finish that looks thicker. We don't have the post curing—like the curing that takes place with solvent-borne finishes—over the next two months."

Anderson is equally impressed. "With the UV product, it's done," says Anderson. "When we polish it, it's cured so we have a better looking product. It doesn't change after time sitting in a store. A year later, it looks just like it did when it left here, so it gives us a better finish quality."

### UV benefits abound

Acrylate is incredibly tough, which is good for the end user; it also makes the assembly process easier because the coating is not as fragile. "The guitars don't scratch easily during the mechanical process of assembly, which includes drilling holes and attaching parts," says Anderson.

Switching to UV also saved both manufacturers valuable curing time. For a large manufacturer like Taylor, it made a big impact—saving 13 days of finishing time per guitar. From assembly to shipping, a Taylor guitar now requires a little more than a week for production, and one day of that is the finishing cycle. Taylor makes 143 guitars a day with one or two days worth of guitars in the finishing department at any given time. Before, there would have been 14 days worth of guitars curing. "We love our UV system," says Taylor. "It works very well and is basically trouble-free."

Both companies came up with systems with very low VOCs, which is good for both the workplace and the environment. "The UV product we use is not 100% solids, so it does have some solvent in it—it's not zero VOCs," says Anderson. "A lot of people use 100% solids on flat line finishing, but that finish doesn't have anywhere to run. When we're working on a three-dimensional part, we can't spray 100% solids without getting some sags and drips."

For both companies, the cost of traditional versus UV-curable finishes is comparable. "Acrylate is a little more expensive, but there's so little finish on a guitar," says Anderson. "Two dollars more for a \$2,500 guitar is not significant. And the quality and speed are so much better that it far outweighs the small increase in cost."

These master craftsmen are truly innovators in an industry moving toward UV technology. "Many guitar manufacturers are now going to UV," says Anderson. "Bigger companies love the speedy cure. They make 100 to 200 guitars a day—that makes a large inventory they don't want to have sitting around curing."

Neither manufacturer wants to go back to the old ways. "We're very impressed with UV," says Anderson. "We wouldn't switch for anything." ■

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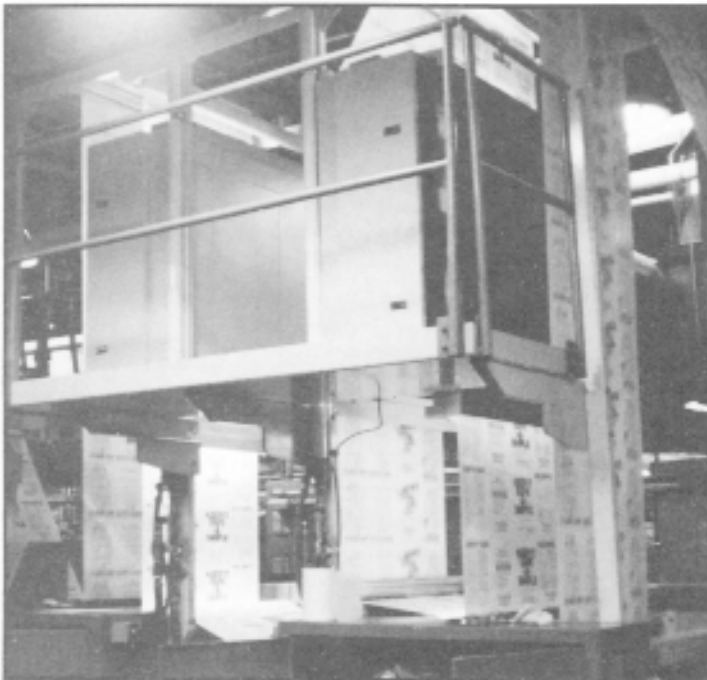
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