



Adhesives play key role in guitar construction

A variety of wood glues are used to assemble the 175 pieces in a six-string guitar. Matching the proper adhesive with the application is important for Taylor Guitars.



Adhesives play a vital role in the construction of a quality guitar. A variety of glues are used in a Taylor Guitars instrument.

Gluing the bridge to the guitar body. A six-string guitar has 175 separate pieces.

Plant Facts

Taylor Guitars
El Cajon, Calif.

Product: Guitars

www.taylorguitars.com

When Leo Kottke plays his Taylor 12-string guitar, the audience isn't thinking about the role that adhesives play in the music.

In fact, adhesives play a key role in the construction of the instruments, says Chris Wellons, vice president of production at Taylor Guitars. Nearly all of the 175 pieces that make

up a six-string guitar, and the 250 in a 12-string instrument, are hand assembled using a number of different glues. Wellons says about 95 percent of every guitar manufactured at Taylor's plant in El Cajon, Calif., is assembled with yellow aliphatic resin glue.

The Taylor Guitars factory in El Cajon is where raw wood is cut, milled, sanded, bent and finished to create the musical instruments.

The company makes 80,000 guitars and 15,000 guitar cases annually, and 95 percent of all pieces are hand-glued after parts are cut. Taylor uses different adhesives for various applications, including Franklin Adhesives Titebond, Multibond 2015, Assembly High Tack, Titebond 50 and Titebond Melamine. The use of Franklin Adhesive products in Taylor Guitars goes back nearly 20 years, according to Wellons.

"Other than the industrial yellow/woodworking glues that are commonly found throughout our factory, we also use double stick tapes/adhesives, UV cured glue, epoxies, cyanoacrylates and an ultrasonic welder for adhering plastic parts, as is the case with adhering our Expression System top sensors," says Wellons.

Guitar construction

At the El Cajon factory, the process of constructing a guitar begins with seasoned, raw wood. Mahogany is the wood of choice for necks and pegheads. Once both parts have been milled, shaped and sanded to their final form,

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the application process begins.

Beginning at the top of the guitar, at the peghead and neck junction, a scarf joint binds the peghead to the rest of the neck. In this scarf joint, precision is needed for the right fit, and a light application of Titebond 50 is used.

“Once we started using it, we found it worked in a variety of applications due to its high temperature tolerance,”



Woodsets await cutting and assembly. Mahogany is the preferred species for necks and pegheads.

says Wellons. “With both switch joints and finger joints, we found Titebond 50 just makes these traditionally weak areas stronger under pressure.”

Both the peghead veneer and the fingerboard, constructed from solid, dense ebony, are adhered to the peghead and neck with Titebond 50. A thin coat is applied and the neck is set aside to dry before it makes its way to fretboard inlay.

Titebond 50 is also used in the interior of the body to attach the heel block; at the base of the neck and on the kerfling, which is aligned around the shape of the body to increase the surface space to adhere the top and back to the sides of the guitar body.

In select models, Titebond Melamine is used. As with mechanical adhesives, the surface area is sanded so that materials will adhere, as the adhesive is applied with a roller coater to the pieces as they are placed. Celluloid binding of Ivoroid and Tortoiseshell and vinyl purfling, the trim around guitar bodies on several of Taylor’s popular models, are attached with this method.

Once the top and back are attached



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to the sides, the guitar is prepared for its glossy finish. While strength is the main benefit of using Titebond 50, Taylor Guitars uses a special formula that includes a fluorescent SP additive. Prior to receiving its glossy finish, each guitar is held under a black light to ensure no glue has made its way onto the top, back or sides of the model.

“This test, which we use as one of the many steps of quality assurance, works by scraping and sanding the guitar parts, then holding the said part under the black light,” Wellons says. “Any residual glue is identified by the ‘glowing’ additive, which is then noted and removed before finishing. Franklin supplies the glue premixed with the additive in it for this step in the manufacturing process. We regularly use the same glue without the additive elsewhere in the factory.”

After gloss and neck attachment to the body, the guitar makes its way to the final assembly area of the factory,

where a bridge will be placed and the guitar strung. With tension between the peghead and body the main factor in neck bending and body bowing, bond strength in the bridge and its attachment to the body is vital. Here, Taylor uses the Assembly High Tack formula.

“The tension on this joint, or what tension the strings produce, ranges from approximately 125-175 pounds,” Wellons says. “The tension is different from a six- to a 12-string guitar and also can change depending on the tuning. The main fact is, the larger the glue surface, the stronger the joint and truth be told, the joint is always stronger than the wood itself.

“In the testing process to evaluate adhesives, we placed the guitar neck on an arbor press, against a load cell to determine the strength of the product,” Wellons says. “Out of the many products tested, Titebond 50 had the highest pound per square inch resistance to breakage.

On-site tests

“We perform a variety of in-house and on-site testing, including stress/

load tests. As our guitars are shipped all over the world, it’s important to measure how well they perform in diverse climates. Through this, we subject the products to high/low humidity and varying temperatures in a humidity chamber, which provides a controlled environment. We will also use “real life” tests such as shipping guitars to and from locations using prototypes made with the test materials which are then played, traveled with, and banged around a bit, to see how they hold up. “

Multibond 2015 is used in the nearby town of Tecate, Mexico, where Taylor manufactures 15,000 guitar cases per year. Here, plywood makes its way through a roller coater applicator and is applied to guitar cases for a laminated effect.

Creating a guitar is a laborious process which can take anywhere from eight to 21 days. The use of these adhesives and Taylor’s high quality control standards reduce the risk of quality issues that may pop up as the guitar makes its way toward final assembly.

The audience may not realize it, but adhesives are a big part of the finished instrument. ●



Taylor Guitars makes 80,000 guitars annually in its El Cajon, Calif., plant, along with about 15,000 cases made at Tecate, Mexico.

For more info

Franklin International, Glues and adhesives

www.franklinadhesives.com 614.443.0241

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