FENDER MUSICAL INSTRUMENTS CORPORATION

Rocking the world of guitar manufacturing with SolidWorks software

SolidWorks software has enabled Fender to save time, increase throughput, and achieve more consistent quality.

Fender Musical Instruments Corporation ("Fender") is a leading manufacturer of stringed instruments, including electric, acoustic, and bass guitars, as well as guitar amplifiers. Since the founding of its predecessor company in 1946 by "Leo" Fender, Fender has built a reputation for producing some of the world's best-sounding and best-playing electric guitars. Fender's Stratocaster® and Telecaster® guitar models have become rock-and-roll icons as the instruments of choice for such legendary guitarists as Jimi Hendrix, Eric Clapton, and David Gilmour.

For much of its history, Fender produced guitars by hand, and the company continues to operate a Custom Shop, where artisans still handcraft custom-ordered guitars. As the company has grown, however, it has integrated design and manufacturing technologies into its traditional processes and methods to achieve greater consistency and efficiency, and to keep pace with a continuously expanding market. While the company used AutoCAD® 2D design tools for many years, the 2002 acquisition of the Jackson® guitar brand—created via the debut of the Jackson Rhoads guitar for former Ozzy Osbourne guitarist Randy Rhoads—brought more complex geometry challenges, according to Glenn Dominick, senior manufacturing engineer.

"Jackson guitars are a completely different type of guitar," Dominick explains. "The geometry is complex. We can better address Jackson design challenges with 3D, particularly the neck shape, because its 15-degree angle makes tooling much more difficult to produce. Since there is no efficient way to develop fixtures on those kinds of angles using 2D, we have to use a 3D tool for Jackson guitars."

Fender chose SolidWorks® CAD software—first deployed on the Jackson and Fender® Stratocaster lines and now used companywide—because it is easy to use, includes advanced surfacing capabilities, and integrates well with computer-aided manufacturing (CAM) applications.

Challenge:

Take the design and manufacture of guitars from a handcrafted art to automated production while maintaining quality.

Solution:

Implement SolidWorks 3D design software to automate design and production.

Results:

- Cut production time by 20 percent across the board
- Reduced time required to shape guitar necks by 30 percent
- Eliminated many secondary operations
- Increased production throughput with improved tooling

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Redesigning manufacturing processes

On the Jackson line, Fender redesigned its manufacturing processes to accommodate the line's more intricate and complex shapes, as well as to take advantage of automation. "SolidWorks software has enabled us to improve our secondary manufacturing processes with CNC machining," Dominick stresses. "Because we have an accurate, precise 3D model of the guitar body, we can take advantage of the efficiencies associated with programming tooling paths and procedures using automated equipment.

"Since we began using SolidWorks software, we have been able to complete the most difficult step—developing the neck back shape—30 percent faster," he adds. "That's just one example of how SolidWorks software is helping us cut time and manual steps from the process. By using SolidWorks software, we have reduced manufacturing time by at least 20 percent across the board, and have boosted production throughput by creating better tooling and taking advantage of better CAM programming."

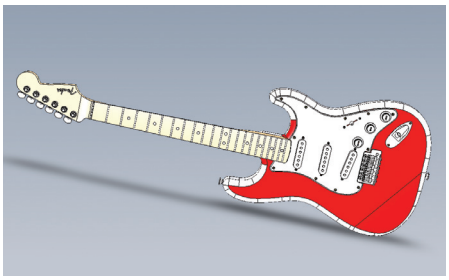
"SOLIDWORKS HAS ENABLED US TO IMPROVE OUR SECONDARY MANUFACTURING PROCESSES WITH CNC MACHINING."

Glen Dominick
Senior Manufacturing Engineer

Meeting demands for greater consistency, better performance

In addition to saving time and increasing throughput, SolidWorks software is helping Fender achieve more consistent quality and an equally high level of performance from instrument to instrument. "With a hand-built guitar, you want every guitar to be different and have its own sound. But with a production model, you want to standardize shape, quality, and performance," Dominick points out. "A Fender Master Builder can use a lot of tricks and extra sanding to finesse the handcrafted instrument to achieve what he wants. On production models, we want to produce the same level of quality performance over and over again.

"Using SolidWorks software, we know that the notes are going to intonate correctly and that we will produce more consistent playing instruments," he adds. "SolidWorks software helps us achieve consistency through a higher degree of accuracy and greater levels of automation."



With SolidWorks software, Fender can take advantage of more complex shapes and automated production processes.

Standardizing across all production facilities

Fender first used SolidWorks software to design a recent Stratocaster guitar model at its facility in Baja California (Mexico) and to drive manufacturing of the Jackson line. Since then, Fender has standardized on SolidWorks software across all products and facilities, and now operates more than 20 seats of SolidWorks software throughout the company.

"We have standardized on SolidWorks software across the operation, from research and development through manufacturing," Dominick notes. "Working on the same 3D platform makes it easier to share ideas and furthers our goal to produce consistently high-quality guitars with less effort and fewer manual operations."

Fender

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