

Mark Richey Woodworking

Customer Success Story

Autodesk® Inventor®

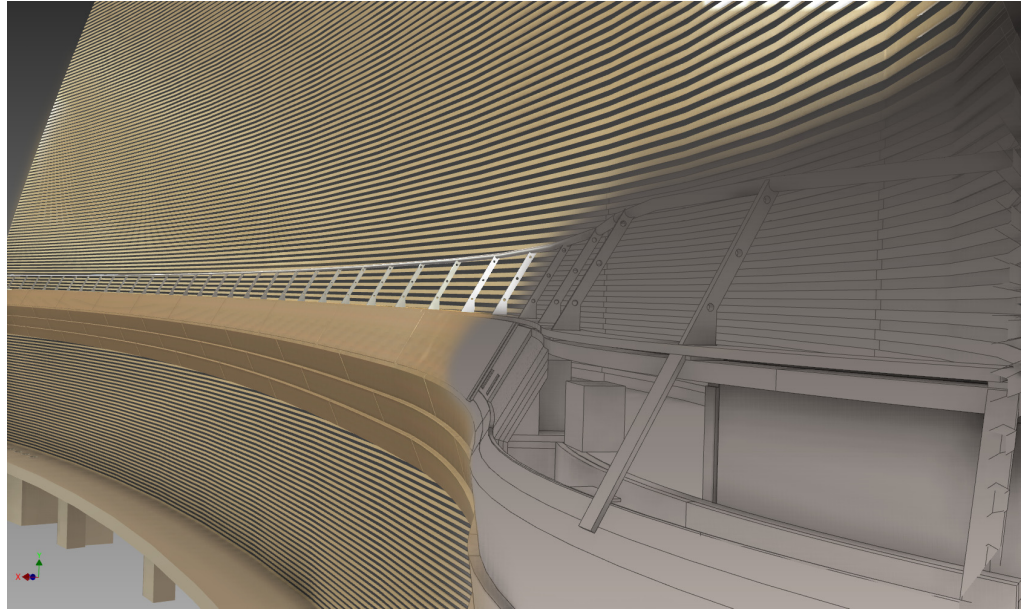
Autodesk® Vault

Without Inventor software, we might have gone down a road in real time, with real wood, only to discover something wasn't working right. Instead, we used Digital Prototyping to analyze cut sections and virtually identify and fix mistakes.

—Rich Winokur
Engineering Manager
Mark Richey Woodworking

Woodworking that sings.

Mark Richey Woodworking crafts acoustically and visually stunning woodwork using Autodesk software.



Project Summary

Renowned for its compelling high-end architectural millwork, Mark Richey Woodworking relies on techniques hundreds of years old to shape, carve, and fabricate wood in myriad ways to create beautiful and lustrous structures. With its extensive expertise, the company was a perfect fit to develop and install the precision millwork required for Helzberg Hall, a 1,600-seat music hall that is part of the new Kauffman Center for the Performing Arts in Kansas City, Missouri. Renowned architect Moshe Safdie designed the Kauffman Center, and JE Dunn Construction Company is managing construction. When complete, Helzberg Hall will house the Kansas City Symphony and host other performance groups of all types and genres. The organically curved, open design for Helzberg Hall will allow members of the audience to interact with each other naturally and enjoy virtually perfect sound quality. To model the building's complex geometry, Mark Richey Woodworking relied on Autodesk® Inventor® software. Using Autodesk Inventor software and Digital Prototyping, Mark Richey Woodworking was able to:

- Pre-engineer complex geometry for millwork before construction began
- Find and solve potential problems prior to on-site construction
- Help coordinate construction trades throughout the installation process

The Challenge

Developing the complex woodwork for the 80-foot-tall, domed Helzberg Hall was a daunting prospect, even for the seasoned experts at Mark Richey Woodworking. "There's an incredible amount of complicated millwork on this space," notes Rich Winokur, engineering manager at Mark Richey Woodworking. "Just figuring out how to model pieces that twist and curve through space was a major challenge. Complicating matters, each wood part must align perfectly with other parts to create smooth, polished surfaces."

Designers also had to meet specific density requirements dictated by the acoustical design developed by acclaimed acoustician, Yasu Toyota. "We needed to pay very close attention to the geometries of the space to reflect sound perfectly," says Winokur. "Finishes, surfaces, and geometry together play a crucial role in the acoustic performance of a room."

The Solution

While Mark Richey Woodworking has been using Autodesk Inventor software for years, the company's design team suspected that the Kauffman Center project would push them to use the software in completely novel ways. "Very early on, we knew we didn't have the modeling expertise to tackle this project alone," says Greg Porfido, chief operating officer at Mark Richey Woodworking. "Thankfully, M2 Technologies dedicated its top people to our project. To help us solve crucial engineering challenges, they took us to places in Autodesk Inventor software we'd never been before."

Autodesk®

Mark Richey Woodworking limits on-site rework by engineering complex woodwork before construction begins.

Modeling Complex Geometry

In days past, Mark Richey Woodworking would have tackled the project by surveying the construction site, templating the concrete superstructure and supporting element shapes on-site, and then hand detailing each individual part for the entire space. But with Autodesk Inventor software, designers were able to model each part's complex 3D geometry digitally, accounting for the fact that part models would be flattened for fabrication. "With Autodesk Inventor software, we were able to pre-engineer most of our parts before we ever stepped foot on-site," says Winokur. "The software made it possible for us to overcome one of the biggest challenges on this project: modeling parts twisting evenly through space."

With Autodesk Inventor software, the designers at Mark Richey Woodworking developed unique geometry for every piece of wood in Helzberg Hall—thousands of parts that had to fit together seamlessly when installed. "Every part has a different curvature and aligns perfectly with other parts," explains Winokur. "With help from Autodesk software, we achieved the organic, smooth surfaces we wanted."

To manage the project's thousands of unique parts, Mark Richey Woodworking implemented a specific naming convention with Autodesk® Vault data management software. "Just by looking at a part name, we knew exactly where in the building the part went, down to the assembly it belonged to and the parts that needed to be installed next to it," says Porfido. "By figuring out how we were going to keep track of parts early on in the process, we paved the way for more efficient fabrication and installation."

Digital Prototyping Identifies Problems

Not only did Autodesk software help Mark Richey Woodworking solve its modeling challenges, it made it possible for the team to find problems before

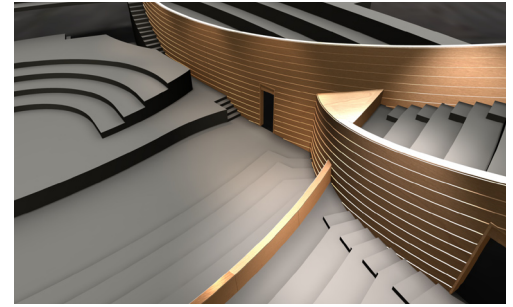
they began fabricating the multitude of wooden elements. For example, the team used interference checking to make sure parts wouldn't conflict with Helzberg Hall's structural elements. "Without Inventor software, we might have gone down a road in real time, with real wood, only to discover something wasn't working right," says Winokur. "Instead, we used Digital Prototyping to analyze cut sections and virtually identify and fix mistakes."

In one case, the interference-checking capabilities in Autodesk Inventor revealed alignment problems between parts. Porfido explains, "Instead of lying on top of each other, some of the parts cut into each other. Thanks to the interference checking in Inventor, we realized that we needed to remodel these parts."

Smoother Construction Process

Because designers could complete much of the engineering before construction, Mark Richey Woodworking was able to add valuable insight to the construction process. "We needed to embed steel support brackets into the concrete to hold up our woodwork," says Porfido. "We'd done so much modeling in Inventor, we could tell the construction team exactly where we needed the brackets before they poured concrete." JE Dunn was instrumental in the process, providing valuable measurement and survey data and coordinating interference checking between the trades.

With Mark Richey Woodworking's digital prototype of millwork and surrounding construction, it was easier to coordinate trades and find issues before they cost money and time in the field. In particular, there was a great amount of coordination among Mark Richey Woodworking, the metal fabricator, and the general contractor on the project. "In one instance we provided geometry to the metal subcontractor," says Porfido. "When they returned their own geometry for the rail work, we used Inventor



to check it and realized it had problems. Thankfully, they were able to address these issues virtually rather than on-site."

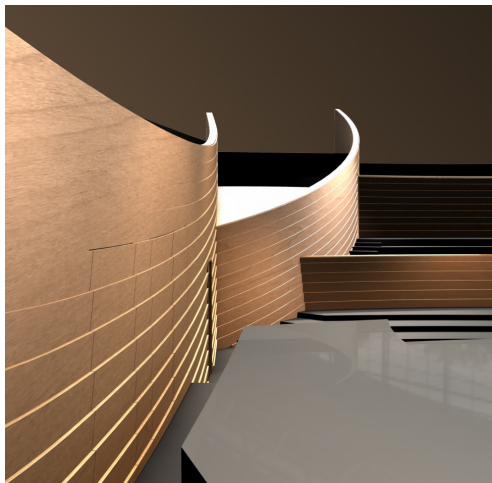
The Result

With construction of Helzberg Hall under way, Mark Richey Woodworking is experiencing even more payoffs from its Digital Prototyping workflow. When the balcony rails were installed, the elements fit precisely to the concrete and steel supports as designed. "We didn't have to make any adjustments," says Porfido. "Without Inventor, we couldn't have planned the installation so perfectly."

In fact, Porfido estimates that without Autodesk Inventor software, fabricating and installing the woodwork on the project would have taken two to three times longer—and cost three times as much. Of incalculable value is the modeling expertise the team gained on the project. "While no job is the same, we're confident our enhanced Inventor skills will make it easier for us to tackle future jobs that involve complex 3D geometry," says Porfido.

For More Information

To find out how Autodesk and Digital Prototyping can help boost innovation, speed design times, and reduce errors, visit www.autodesk.com/building-products.



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