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OREGON TIMBER PRODUCT GETS THE TREMOR TEST IN UNIVERSITY STUDY

Freres Lumber Co. mass timber will be used in a 10-story building that will be tested on a shake table

By: Amanda Arden
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PORTLAND, Ore. (KOIN) – A Lyons-based lumber company is providing wood materials to a large-scale university research project that aims to prove tall timber buildings can be resilient to earthquakes.

The Natural Hazards Engineering Research Infrastructure (NHERI) TallWood project began in 2016. The following year, researchers performed a shake table test at the University of California San Diego on a two-story mass timber building structure to see how it fared when faced with earthquake-like tremors.

Now, five years after that test, the project is set to perform shake table testing of a full-scale, 10-story, mass timber building. Researchers hope their studies will help advocate for novel construction methods that result in safe, more earthquake-resilient building designs.

The NHERI project focuses on using mass timber, which is an engineered timber product that's made from layers of wood that are glued together.

Freres Lumber Co., which has locations in Lyons and Mill City, manufactures its own mass timber product, called Mass Ply Panels. Tyler Freres, vice president of sales, said they're the only company in the world that's making this particular product right now and it will be used in the NHERI TallWood project for the building's vertical walls.

Metal cables will run along the mass timber walls and they'll be held together with seismic restraining elements. Freres said the engineers believe that at the end of the test on the shake table, the wood panels should be completely fine and all that might need to be replaced are the seismic restraining elements.

"The entire goal of using wood for seismically resilient structures is that not only will the building survive afterward, but it can absolutely be habitable again," Freres said.

FRERES LUMBER CO. WILL BE PROVIDING THE MASS TIMBER USED IN THE VERTICAL WALLS OF THE BUILDING, AS SEEN IN THIS DESIGN. IMAGE COURTESY SHILING PEI, NHERI TALLWOOD PROJECT TEAM

He said if a building made from wooden mass timber products shifts, it can be repaired, recentered and stood upright again when the seismic restraining elements are reintroduced and reinstalled in the building.

Wood is also a lot lighter than concrete and steel, which is another advantage when it comes to seismic resiliency. Freres said its lighter weight means there's less mass moving around at the top of a building that could be affected by an earthquake.

Freres said the number one thing his company hopes this research discovers is an "R value" for the building, which is essentially the reactivity of the building to a seismic event. He said a number like that doesn't exist right now for wood. It could help them determine how much more rigid the structure needs to be. He also said research could help improve design codes and construction standards and methods.

“So, the more we can refine the ‘R value’ the more cost-effective it becomes in order to design a building out of this type of material,” he said.

Freres also said that if researchers can find a way to build a structure out of wood that will remain habitable after a seismic event, it will be a “game changer” for the industry. He said it would prove that investments and insurance dollars wouldn’t be lost on wooden buildings.

Already, Freres Lumber is providing mass timber material for large buildings, including the wooden roof project at the Portland International Airport. The airport’s new main terminal roof is designed to flex and withstand a Cascadia Subduction Zone earthquake.

Freres Lumber is celebrating its 100th anniversary in 2022. Tyler Freres said his family never anticipated they’d be on the cutting edge of patenting a new type of wood product and said they hope to be around for another 100 years.

“I think everyone around here is pretty happy that we can show that we can develop pretty interesting things here locally,” he said.

The foundation and shake table pad are now being built at the University of California San Diego. Structural construction is scheduled to begin in mid-April and testing will take place between September 2022 and mid-January 2023.

Freres Lumber said at the end of the testing at UCSD, Oregon State University will perform additional studies using four stories of the original structure on its own shake table.

Dr. Shilling Pei, an associate professor in the Department of Civil and Environmental Engineering at the Colorado School of Mines, is the project lead for the NHERI TallWood shake table test. Other principal investigators include Jeffrey Berman from the University of Washington, Keri Ryan from the University of Nevada, Reno, James Ricles and Richard Sause from Lehigh University, Dan Dolan from Washington State University and John van de Lindt from Colorado State University.

Three of the collaborating researchers are from Oregon State University.

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