# driSteem 🛞

# Specific wood moisture content ensures short curing time for adhesive

Katerra emerged in 2020 as North America's only mass timber producer offering design, manufacturing, and construction services<sup>1</sup>. This distinction, along with production capacities achievable only with end-to-end automation, quickly landed Katerra on top, with 30% of North America's Cross Laminated Timber (CLT) capacity.

Contracting firms putting up commercial properties and multifamily residential buildings choose CLT panels to avoid half a dozen pain points, beginning with time and followed up with labor, logistics, design, fit, and finish, all of which impact project cost.



No shortage of employee parking. Just 48 people run the entire 270,000-square-foot operation.

## BOARDS SHAPED, ORIENTED, AND TRANSPORTED VIA FACTORY AUTOMATION

A parade of flatbed tractor-trailer rigs deliver lumber to Katerra in the form of 2x6 and 2x12 soft pine and Douglass fir bundles. Incoming boards acclimate to factory air overnight, then centrally controlled push rods bump individual boards directly from storage to a track moving at the speed of a person jogging. Photoelectric sensors watch for the boards, and flippers divert them through jointers, planes, and mitering jigs. The boards are flipped to assigned layers at alternating orientations, and adhesive is dispensed on all mating surfaces. So far, no human in the building has touched a single board. Eventually, the boards converge to form a multi-layered panel up to a foot thick, 12 feet wide, and 60 feet long and bonded with adhesive stronger than the wood itself. This mass timber, containing up to 1,041 twelve-foot-long boards, is then conveyed to North America's largest press.

## WOOD NEEDS MOISTURE CONTENT FOR ADHESIVE TO CURE

Giant air bags in the press inflate to direct tons of clamping force from all six sides of the assembled panel. Moisture squeezes out of the wood and interacts with adhesive between all the layers and rows of wood. This moisture is the catalyst for CLT adhesive. Katerra has learned that humidifying the factory to 55 percent relative humidity (RH) gives wood the best moisture content for the shortest curing time.



Milling machine cuts window and door openings into finished CLT panel. Photo-electric inspection during panel assembly ensures that only the most attractive boards are exposed, with the interior-facing side getting the best boards.



#### CLT-constructed building at EWU

40-foot-long CLT panels installed vertically for the Catalyst building at Eastern Washington University provide solid, multi-story wall sections.

- Katerra Emerges as North America's Only End-to-End Mass Timber Design, Manufacturing and Construction Firm. Business Wire. August 4, 2020. https://www. businesswire.com/news/home/20200804005244/ en/Katerra-Emerges-as-North-America%E2%80%99s-Only-End-to-End-Mass-Timber-Design-Manufacturing-and-Construction-Firm
- Average Weather in Spokane Valley Washington, United States. Weather Spark. https://weatherspark. com/y/2023/Average-Weather-in-Spokane-Valley-Washington-United-States-Year-Round

#### **RESOURCES:**

Find your local DriSteem representative: <u>dristeem.</u> <u>com/find-a-rep</u>

Learn about the following equipment installed in the Katerra CLT factory:

Hydrotrue® water treatment systems: <u>dristeem.com/</u> products/water-treatment

Adiatec<sup>®</sup> High-pressure System: <u>dristeem.com/</u> products/evaporative-cooling-humidification/highpressure-systems

#### **DRI-STEEM Corporation**

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#### CHALLENGES TO HUMIDIFYING 8.1 MILLION CUBIC FEET OF KATERRA AIR

Cold ocean waters and nearby mountains give Spokane Valley an arid climate with low dew point temperatures. Weather Spark references a humidity comfort scale with six levels from *dry* to *miserable*. Meteorologists consistently observe Spokane Valley to be in the two driest levels year-round and 24 hours a day.<sup>2</sup>

In addition to climate, the need for humidification at Katerra is heightened by the building's design conditions. Dust collection and adhesive processes in the plant drive high outside air requirements, up to 100 percent, through eight 80,000-cfm air handling units.

#### DRISTEEM SYSTEM HUMIDIFIES WHILE LOWERING BUILDING'S COOLING LOAD

Katerra contacted Custom Mechanical Solutions (CMS), DriSteem's Washington rep, for a recommendation on how to maintain a constant RH set point in their production facility. Upon learning the breadth of the job and the design conditions, CMS worked directly with DriSteem engineers to design a system that would not only humidify the building, but also reduce the building's cooling load on hot days.

The DriSteem system, commissioned at Katerra in 2020, consists of almost half a mile of stainless steel tubing crossing back and forth below the ceiling beams 30 feet above the floor. Every few feet, a nozzle atomizes water into droplets so tiny that they undergo total evaporation 20 feet above the floor. The cooling effect is palpable on the floor as the humidified air settles.

"We maintain a set point of 55 percent RH, and their wood absorbs that moisture from the air," said DriSteem engineer Dave Schwaller. "Our Highpressure System atomizes so much water and so quickly that response time is short. Katerra shuts it off on weekends and quickly gets back to set point every Monday morning."

DriSteem is proud to be selected for two critical processes—water treatment and air humidification—in a technology that disrupts the construction industry by making residential and commercial building construction faster and more sustainable.



The dispersion grid includes 900 atomizing nozzles in 2,400 feet of tubing. In the mechanical room, water softeners and reverse osmosis water treatment systems make pure water for the High-pressure System. The system atomizes 1,200 gallons per hour for humidification and, for a summertime bonus, free cooling.