Aptly named for its goal of inspiring new ways to build, Catalyst is the first cross-laminated timber (CLT) office building constructed in Washington state and the first to use panels produced at Katerra’s new CLT production facility. It is also designed to Passive House principles and to achieve zero-carbon and zero-energy certification from the International Living Future Institute (ILFI), making it a leading example of sustainable building design.

"Catalyst, which anchors the new South Landing Eco-District, is more than just another smart building project," said Dean Allen, CEO of McKinstry. "It is the cornerstone of a fully integrated neighborhood that will serve as a living laboratory for new sustainability technologies, materials, construction techniques and operational practices. Catalyst demonstrates how the built environment can be constructed and operated to serve our partners, our clients, our communities and our planet to deliver sustainability and impact, not just physical space."

**PROJECT DETAILS**

**LOCATION:** Spokane, Washington  
**STORIES:** Five stories plus partial day-lit basement  
**SIZE:** 164,000 square feet  
**CONSTRUCTION TYPE:** Type IV Heavy Timber  
**COMPLETED:** 2020

**PROJECT TEAM**

**CLIENT/OWNER:** Avista Development, McKinstry, South Landing Investors LLC  
**ARCHITECT:** Katerra (Architect of Record) + Michael Green Architecture (Design Architect)  
**STRUCTURAL ENGINEER:** KPFF  
**CONTRACTOR:** Katerra Construction  
**CLT SUPPLIERS:** Katerra, Structurlam  
**GLULAM SUPPLIER:** Western Archrib  
**RIB PANEL ENGINEERING AND SUPPLIER:** Katerra

Catalyst is the first CLT office building in Washington State, and the first to use CLT panels produced at the new Katerra facility in the Spokane Valley. The use of CLT means the building will have a smaller carbon footprint than comparable buildings built with steel and concrete.

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1 LCA of Katerra’s CLT and Catalyst Building, Carbon Leadership Forum and the Center for International Trade in Forest Products at the University of Washington (2020), https://carbonleadershipforum.org/katerra/  
3 Environmental Product Declarations (EPDs) for Wood, American Wood Council, www.awc.org

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Innovative CLT Applications

The galvanized beams used in the park and learn structural frame were designed to resist UL 1709 fire exposure, with fully stressed exterior webs, fully stressed interior webs, and FAY and FIY with sheathing. These pre-engineered products were made using engineered ply (EP) for a seamless and easy integration of CLT structures and conventional materials. The 4-inch and 6-inch panels were the first product to be sold off the line at Katerra's fully integrated CLT facility in Pullman, Washington. Today, Katerra's plant is certified to build full six-story buildings.

Catalyst was built on top of a conventional concrete slab and the metal frame was left intact at the building's core. Building-integrated solar panels are used as high-strength structural load-bearing elements for the fully CLT mid-rise, much like Katerra's newest CLT mid-rise in LAX. These solar panels were stacked and integrated together with the CLT panels through an air-tight wall. "The wall was glued into the bottom of the panel on the floor above could be dropped into the void, and then we added an entirely new exterior skin on top of that," said Hans-Erik Blomgren, Director of Innovation at Katerra.

"We had full continuity and the structural frame would not change," said Blomgren, "which allowed for a seamless wall connection and stiffness connection," said Hans-Erik Blomgren, Director of Innovation at Katerra. "The CLT frame was a progressive design, which the design team verified with testing."

Catalyst also utilized an innovative timber-framed composite floor panel system. Glued and inclined two gluelaminated timber I-joists were used, which culminated in very efficient 30x30x30-foot panels at the factory, making the panel to perfectly within Catalyst's 30x30-foot grid while still offering advantage of Katerra's mass timber production scale. "One of the things I'm confident about was making our timber floor panels onto the grid," recalled Blomgren.

"To our knowledge, this is one of the finest projects in North America able to achieve a true 30x30 grid with something this remarkable," said Kora Todd, Safety Manager at Catalyst. "Our goal was to create a building that would promote health and wellness for all who work in it. Healthy living has been proven to increase employee performance, safety and health, and reduce employee turnover. At Catalyst, we are doing that by providing a healthy environment for all who work there."

"Most of the time, employees spend more time working on their computer than they do on a bed or sofa. So it's important to make sure they have a healthy and comfortable work environment," said Blomgren.

"It's important to make sure they have a healthy and comfortable work environment," said Blomgren. "We've designed the building with attention to detail and made sure that it provides a healthy and comfortable work environment for all who work there."

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An innovation in timber engineering, which is described as one of the most promising and forward-looking developments in the industry, has been implemented in Catalyst, the building that is being highlighted. This innovation is the use of CLT (Cross-Laminated Timber) panels in the structure of the building. CLT is a type of engineered wood material that is made by bonding layers of sliced timber together with extreme pressure and heat to create a strong, lightweight, and durable building material.

The CLT panels used in Catalyst are approximately 10x30 feet in size and weigh just 41 psf. The 30-foot span is perfect for office use, a shallow span-to-depth ratio of 15.5, explained Blomgren. “Even when we added lightweight concrete topping, the panel still weighed just 41 psf. The 30-foot span is perfect for office use.”

Innovative CLT Applications

The galvanized beams used in the park and other structural frames have been critical in the success of the building. The CLT shear panels were stacked and spliced together with precision and care to ensure the panels were aligned properly. The CLT shear panels were also used to create a concealed, strong connection for the floor panels and hardware—and each had four to five people dedicated to testing.

Safety was another benefit of the CLT rib panels, since all components were manufactured offsite. This allowed for a shallow span-to-depth ratio of 15.5, which means lighter materials could be used without compromising structural integrity.

The CLT rib panels were designed to fit precisely into the building’s envelope, maximizing the efficiency of the construction process. The panels were delivered to the job site and installed in a matter of days, allowing for a seamless integration of the building components.

As a result, the cladding performance exceeded the prediction models. The team worked closely with the architects to ensure that the CLT panels fit precisely into the building’s envelope, maximizing the efficiency of the construction process. The panels were delivered to the job site and installed in a matter of days, allowing for a seamless integration of the building components.

The success of Catalyst demonstrates the potential of cross-laminated timber as a sustainable building material. The building has achieved LEED Platinum certification, which is the highest level of certification for sustainable buildings.

In conclusion, the use of cross-laminated timber in Catalyst has demonstrated the potential of this innovative material in sustainable building design. The success of this project serves as a testament to the future potential of cross-laminated timber in the building industry.
The five-story Catalyst contains classroom and lab space for the five blocks in the world? The end-to-end collaboration used to building in what they hope will eventually become the smartest composite action,” added Katerra’s Design Project Manager, wood composite action in these rib panels instead of concrete weighed just 41 psf. The 30-foot span is perfect for office use, making the panel fit perfectly within Catalyst’s 30x30-foot underside of each 10x30-foot CLT floor panel at the factory, a glued-in rod connection. “The rods were glued into the glulam beams used in the post-and-beam structural frame, even down to the vibration and acoustic barrier, window pre-flashing and insulation to the 3-ply CLT structural frame, added Nicolow. “When designers know the optimal capabilities of the CLT manufacturer, they can work to get the most out of it.”

Accurate and reliable performance also exceeded the prediction models. “We were able to use the floor plans up to the very day of erection,” said Mingyuk Chen, Design Team Lead at Michael Green Architecture. “Once the final plans were confirmed, we were able to get the floor plans out to the CLT manufacturing team to optimize the fit between the built panels to the job site rather than site-building from a kit.”

End-to-End Design, Manufacturing and Construction Efficiencies

One of the things that surprised us about the project was the extent of coordination and team work that was necessary to successfully pull off this project,” said Blomgren. “To me, it’s one of the most exciting aspects of the project.”

In 2019, Katerra commissioned the Carbon Leadership Forum’s Embodied Carbon Benchmark Study for commercial projects is 396 kg CO₂e/m²,” he said. “The overall building design and floor plan,” said Kleman. “The WBLCA shed light on the overall sustainability of the project, showing a surprising amount of carbon sequestered in the CLT structure, and the importance of considering embodied carbon.”

“Other designers know the optimal capabilities of the CLT manufacturer and can work to get the most out of it,” added Nicolow. “When designers know the optimal capabilities of the CLT manufacturer, they can work to get the most out of it.”

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1. LCA of Katerra’s CLT and Catalyst Building, Carbon Leadership Forum and the Center for International Trade in Forest Products at the University of Washington (2020), https://carbonleadershipforum.org/katerra/