CASE STUDY

Janicki Industries Building 10

Aerospace manufacturer uses mass timber to meet speed, sustainability goals

Almost every decision made on this project had to do with speed.

Janicki Industries, an engineering and manufacturing company specializing in advanced composite materials and assemblies for the aerospace, defense, and other high-tech industries, had landed an important contract and needed a new building. Their other nine manufacturing facilities had been built with steel and concrete, but when it was time for Building 10, pandemic supply issues had created a 12- to 14-month wait time for steel bar joists.

Known for delivering on their promises—Janicki received a coveted *2023 Supplier of the Year* award from Boeing—they knew they needed something different. They also knew they wanted to design and construct a sustainable building that would contribute to the health of Pacific Northwest forests. The company's president, John Janicki—a former architect himself—told the project team he wanted to solve the problem using mass timber.

"We wouldn't have met our contract if we hadn't switched to mass timber," he said. "But even though speed was a big part of our decision, we'd been wanting to build using wood for some time. Forest health is important to me, and I'm a huge proponent of doing whatever we can to manage the resource so we have a forest products industry that can go on forever."

Schedule Drove Decisions

Originally slated to be just 60,000 square feet, the building tripled in size as Janicki's contract grew. Jordan Janicki, Principal of structural engineering firm DCG/Watershed (and John's nephew) said that meant they needed to focus even more on value engineering the project for speed. "It was a crazy schedule," said Jordan. "We started schematic design in February 2022; it became a 90,000-square-foot building in March, and then grew again in size from there. We finalized drawings at the end of March and applied for permits in May. Close coordination played a critical role throughout the entire process."

PROJECT DETAILS

Janicki Industries Building 10 (B10)

LOCATION:	Hamilton, Washington
STORIES:	Two
SIZE:	188,000 square feet
CONSTRUCTION TYPE:	Type V-B
COMPLETED:	2023

PROJECT TEAM

OWNER/DEVELOPER:	Janicki Industries
ARCHITECT:	Carletti Architects
STRUCTURAL ENGINEER:	DCG/Watershed
GENERAL CONTRACTOR:	Chad Fisher Construction
MASS TIMBER MANUFACTURER:	Vaagen Timbers
CONNECTORS AND FASTENERS:	Simpson Strong-Tie

Connect with the Janicki Industries Building 10 project team at *https://www.woodworksinnovationnetwork.org/projects/b10-manufacturing-facility*

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>
> – **Dan Fisher**
> **Owner**
> **Chad Fisher Construction**

The manufacturing portion of the facility includes concrete tilt-up walls with glue-laminated timber (glulam) columns supporting large glulam trusses spanning 80 to 102 feet. Glulam rails attached to the mass timber columns support huge overhead cranes needed for Janicki's manufacturing processes. An attached two-story office was fully constructed with mass timber, including glulam beams and columns, cross-laminated timber (CLT) walls, and glue-laminated timber (GLT) floor and roof panels.

Chad Fisher Construction began ground improvements and geopier installation in June 2022. To help meet the schedule, Janicki's own employees fabricated the mass timber trusses. They began assembly in November 2022 and completed the trusses in March 2023. Chad Fisher Construction's crews began installing the first timber components in late January 2023, and Janicki began installing their equipment in the completed structure just five months later.

Because of the demanding deadline, Vaagen Timbers began making the mass timber components while Carletti Architects and DCG/Watershed were still designing the building. "Speed of construction is so important in the industrial market because every day you're not manufacturing, you're not making money," said Tasha Luu, Project Manager for Vaagen Timbers. "We knew it was important for John's employees to get into this building and begin operations, so we started sourcing lumber and producing the mass timber components right away. You can't do that as easily with other materials."

Industrial Design Considerations

Carletti Architects had a long-standing relationship with Janicki; they'd already designed Buildings 1 through 9, but those were steel and concrete. Building 10 was Carletti's first experience with mass timber. "Our first step in pre-design was determining the construction type relative to building occupancy," said Quientin Sutter, Principal and Co-owner. "By limiting the number of stories and providing open frontage, we were able to use Type V-B construction. Type V-B has lower fire-resistance rating requirements than other construction types, which gave us a lot more flexibility."

Building 10 has several unique features:

- Fifty-nine mass timber trusses, each weighing about 16,000 pounds, support the roof over the manufacturing portion of the building. Spaced 16 feet on center (OC), the trusses form bays 80 to 100 feet across. The huge trusses were assembled in an adjacent Janicki facility, but the team still had to do some creative construction engineering to move them next door and lift them into place. Glulam purlins placed 4 feet OC span between the trusses. The lower roof was topped by GLT panels.
- Ten-ton overhead cranes are supported by glulam rails attached to the glulam columns. The 8-3/4x48-inch columns are notched to support the horizontal rails. "To connect the rails to the column at this joint, we used long lag screws, sized to match the strength and shear of the beam at that location," said Jordan. "This design meant we didn't have to worry about delamination, splitting, or other structural concentrations."
- Janicki will be using specialized equipment to move materials within the facility, but they'll also be running standard forklifts, so Jordan said they considered potential impacts when they chose glulam for the columns. "The column and baseplate connections are all integral," he said. "We used vertical steel 'L' brackets on the corners of the baseplates, which provide both forklift protection at column corners and uplift connection, all tied into one piece."
- Lateral loading was a challenge since the manufacturing portion of the facility has 55-foot-tall concrete tilt-up walls. "One section of the building has an uninterrupted 432-foot-long high bay, and the crane rails run all the way through," Jordan said. "The other side of the building is almost the same. We couldn't span the plywood diaphragm all the way to the ends, so we transferred the lateral loads to two drag trusses."
- The attached two-story, 20,000-square-foot office was constructed completely of mass timber. Wood walls, columns, and ceilings were all exposed on the interior, creating a warm, beautiful space.

Leveraging Steel Installation Experience

Dan Fisher, Owner of Chad Fisher Construction, said he and his team were excited when John shifted to mass timber. “Even though they were still designing the building as we were constructing it, we knew the switch was worth it,” he said. “A few of our crew were familiar with mass timber, but most relied on their steel construction experience; it was an easy transition.”

According to Ian Gibbs, the company’s Project Superintendent, they used a crew size of 10 to install the structural glulam, then a second crew of eight installed the roof purlins and sheathing. “We had three cranes working in tandem, with a small team rigging materials,” said Gibbs. “We also had about a dozen people installing connections and blocking; they were chased by another crew double-checking those connections and making sure all bolts were torqued to the proper strength. We had between 30 and 35 workers on site at any one time.”

Project Costs Reflected Learning Curve

It’s unusual to have an owner/developer fabricate the mass timber components of a project, but the clock was ticking. So, John put his own employees to work.

“Our team is trained to fabricate carbon composite and high-tech steel components for aerospace defense applications, so dealing with wood required a definite learning curve,” he said. “But over time, we got the fabrication time and cost per truss down significantly.”

While mass timber components are often prefabricated to exact specifications with angled cuts or pre-cut openings, the team prioritized speed, shipping beams for the trusses with square edges and accommodating bearing issues with connectors and welded brackets. Fabrication of the first truss took about six weeks, but Janicki’s crews were eventually able to assemble six or more trusses per week.

In the end, the project went over budget, but John is quick to add that he would use mass timber again. “We met our schedule, which was important,” he said. “Hopefully, we’ll have time for more engineering on the next project, so we can drive down the cost of every component. We learned a lot, so I think it’s very doable.”

Jordan agreed, adding, “It costs time and money learning what you don’t know. For the next building, we’ll get to spend more time optimizing the truss connectors and reducing the amount of steel in connectors. We’ll also get to do more with the timber component fabrication, which will also help reduce costs.”

Forest Health and Mass Timber

It’s not easy to quickly source 2.2 million board feet of lumber, but Vaagen Timbers delivered. The lumber needed to manufacture the mass timber components used in Building 10 came from thinning operations on 285 acres of crowded, overstocked Washington forests.

“People talk about fire-prone forests—thick, dense forests that are at risk of fire and disease,” said Luu. “When we thin these areas, we get the lumber we need to produce wood products, and it promotes better growth and diversity within the forest while reducing fire hazards. Our company’s mission is to promote healthy forests for generations to come, and wood harvested in this way is perfectly suited for mass timber.”

Jordan agreed. “I grew up in the logging industry, so for me it’s almost second nature to know that when forests are actively managed it’s a benefit all around. Thinning removes smaller trees, creating a multi-story canopy and biodiversity while protecting the forest from fire danger. Plus, being able to harvest and create a product that pulls carbon out of the environment while also reducing the risk of having carbon released into the environment when a forest burns… it’s one of the reasons we should use wood. Plus, it just looks better.”

Wood Brought the Outside In

Janicki's new contract created 250 new jobs, and John wanted Building 10 to be a great place for people to work. "Our philosophy is to give our employees the very best equipment, training and facilities," he said. "As an architect, I understand the positive biophilic feeling you get with a natural material like wood. I'm not sure people can even identify or understand exactly why; all I know is that when people are in this building, they have a smile on their face and they're happy."

Sutter agreed, adding that because of the proprietary nature of the work being done in Building 10, they couldn't have windows, so they used wood to bring the outside in. "We wanted to enrich that work environment," he said.

Unconventional Approach, On-Time Results

John Janicki's decision to pivot to mass timber enabled them to meet their aggressive schedule. And while mass timber is often described as building with a kit of parts, Building 10 shows that you can still put together a complex mass timber structure quickly, even if every component doesn't arrive at the jobsite fully prefabricated.

"Everything conventional went out the door with this one," said Fisher. "But we were fortunate to have such a diverse team. Brian Jones, our Project Manager, is a former architect, and he worked closely with the design team to visualize details onsite. Normally, the contractor will buy the mass timber, but Janicki Industries did that here. Plus, they fabricated the trusses themselves, which is unusual. Even the permitting was done faster than normal."

Building 10's timeline both challenged and validated the team's decision to use mass timber. "With my background as an architect, owner, and developer, along with the experience we gained in fabricating the trusses, I'm convinced that the switch to mass timber was a good call," said John. "I'll do it again. And while our decision to use wood helped us meet our schedule and sustainability goals, the building we ended up with is also one of the most beautiful industrial spaces around. It's going to be here longer than all of us."

[1] Glue-laminated timber is referred to as glulam when used in column and beam applications and GLT in panel applications.

Janicki Industries Building 10

Volume of wood products used:
179,158 cubic feet

U.S. & Canadian forests grow this much wood in:
14 minutes

Carbon stored in the wood:
4,457 metric tons of CO_2

Avoided greenhouse gas emissions:
1,725 metric tons of CO_2

TOTAL POTENTIAL CARBON BENEFIT:
6,181 metric tons of CO_2

EQUIVALENT TO:

1,307 cars off the road for a year

Energy to operate 653 homes for a year

Source: US EPA

Estimated by the Wood Carbon Calculator for Buildings, based on research by Sarthre, R. and J. O'Connor, 2010, A Synthesis of Research on Wood Products and Greenhouse Gas Impacts, FPInnovations. Note: CO_2 on this chart refers to CO_2 equivalent.

Reducing Carbon Footprint

The use of wood lowers a building's carbon footprint in two ways. Wood continues to store carbon absorbed by the trees while they were growing, keeping it out of the atmosphere for the lifetime of the building—longer if the wood is reclaimed at the end of the building's service life and re-used. Meanwhile, the regenerating forest continues the cycle of carbon absorption. Wood products also require less energy to produce than other building materials, and most of that comes from renewable biomass (e.g., bark and sawdust) instead of fossil fuels. Substituting wood for fossil fuel-intensive materials is a way to avoid greenhouse gas emissions and reduce embodied carbon.

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Photos: Janicki Industries – cover, page 5; Vaagen Media – page 2 and 4, back cover; Jordan Janicki – page 3
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