

POLYGON US CASE STUDY – PDX Next Airport, Portland

Protecting mass timber and construction on PDX Next, Portland airport expansion project

PDX Next, the Portland airport expansion project is a transformative endeavor that uses Oregon’s natural resource of beautiful mass timber in its iconic soaring roof. Compared to concrete and steel, mass timber is quicker to build, uses far less energy, stores carbon, and connects occupants to nature. Contractors responsible for protecting mass timber and other materials wanted to make sure the indoor conditions were properly managed throughout the project.

During the pre-construction phase, Polygon US was invited to discuss a temporary heating solution for the space with general contractor Hoffman Skanska Joint Venture. At the time, stakeholders were mostly concerned with the drywall, casework, finishes, and flooring materials. They wanted a solution to control temperature and humidity for drying and curing purposes and to keep everyone on schedule.



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“It was not unlike Skanska to take a proactive approach to climate control for their material drying,” said Kevin Lockard, Polygon US National Operations Manager. “Best practices or a precedent for mass timber were just emerging so we didn’t have conversations around moisture management for the beams at that point.”

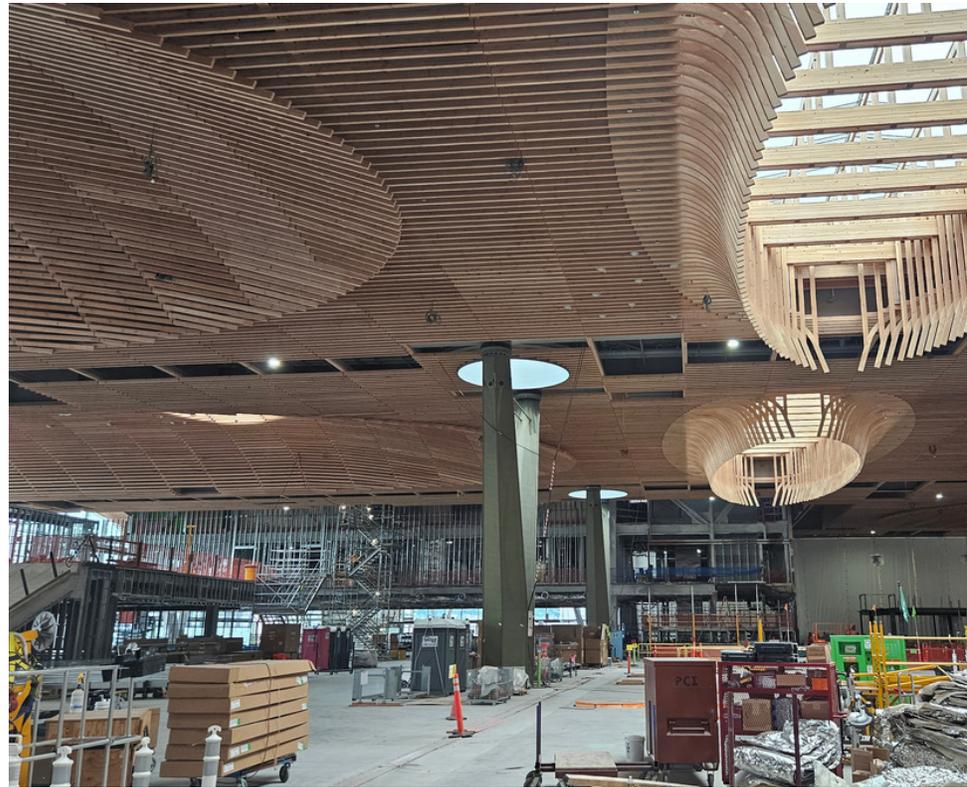
Working together earlier in the process was fortuitous. For one, it helped better anticipate energy, insurance, and logistical costs and challenges. “It was ideal because we were integrated into the building setup from the beginning. It also helped expedite security issues,” said Lockard.

Because Polygon US was a partner in developing a heat solution, the team started to gain a better understanding of the importance and potential risks of the 18 million pounds of mass timber on the job. That’s when the Polygon US team started to formulate a more holistic approach to climate control and materials drying for the client.

PROBLEM

Polygon US knew they needed to heat a space of 213,000 square feet with 50-foot ceilings or about 10 million cubic feet. There would be many installing contractors scheduled through the project and maintaining conditions was key to remaining on pace.

Polygon US weighed indirect-fired heat and direct-fired heat options. Based on the teams’ experience on construction projects, they saw three problems with direct-fired heat for the PDX project:



- One, real estate was going to be a premium so finding and occupying outside space would be difficult. An indirect heater can be placed inside, and the exhaust can be run outside.
- Two, direct-fired heat requires drawing in outside air and heating it up so fuel consumption would be high. It also can introduce humidity. Indirect heat allows 100% recirculated indoor air which is pre-treated, warmer, and more energy efficient.
- And three, direct-fired heat produces fuel-hazardous byproducts, such as carbon dioxide which can negatively impact people and the environment. This didn’t align with what Polygon US knew about the general ESG philosophy of the project which is slated to achieve LEED Gold certification.

The other half of the problem was the mass timber. Polygon US knew the roof was being built in 20 separate sections completely outdoors just west of the airport. While the beams were sealed, it was possible that once assembled onsite, moisture might get trapped and the material be susceptible to mold.

Conversely, the heating equipment might cause over dryness and lead to checking or splitting. Instead of waiting to see if there would be structural issues, Polygon US wanted to offer a more proactive approach to the entire job. They wanted to solve the problems stakeholders identified and help them avoid the problems they might face later.

SOLUTION

Polygon US’ total climate control solution for PDX included both temporary climate control equipment and remote monitoring. Here is a breakdown.

Remote monitoring Temp/RH and Wood Moisture Equivalent (WME)

The first step was to install 24/7 remote monitoring. This included twenty-two (22) ExactAire Multi Sensor devices continuously reading ambient conditions. Six of them were equipped with wood moisture equivalent (WME) probes that take readings of the mass timber beams to report on moisture content. Data was piped to cloud desktop and mobile apps for reporting and alerts.

“Polygon US worked with us to set up a custom ExactAire system, online dashboard, and reporting process,” said Joel Bennett, Project Manager for Hoffman Skanska on the Portland International Airport (PDX) Terminal

Core Redevelopment Project. “It provides important data on the exact conditions throughout the project, in our many different work areas and elevations. We can see if there’s an issue right away, and based on the location of the sensor we can quickly hone in on the cause and get right to work on the solution.”

“We also have the history and trendlines, which provide assurance that conditions are kept within the necessary ranges for our mass timber and finish elements,” explained Bennett.

The trend since August 1 is shown in the ExactAire chart. The WME sensors show that the moisture content was decreasing over time. The fluctuation is evidence that the mass timber is porous, and changes can occur as materials move from outside to inside and as the building is closed in.

Indirect-fired heaters

The next step a few months later was to install five (5) 1 million BTU heaters throughout the indoor space. These produced and recirculated clean, warm air to over 60 degrees Fahrenheit and is offered the most fuel-efficient option.

Naturally, keeping all the installation contractors on schedule is a big part of a GC’s job. Seeing when conditions are ready for materials to go in or when materials are dry means Hoffman/Skanska didn’t waste time. For example, one of the flooring contractors wanted to wait to install materials until conditions were acceptable. With data at hand, the PM was able to prove favorable conditions with Polygon US’ solution to the installer and get on with the project.



“It’s great to be able to show, without any question, that conditions are right. It removes any doubt and helps us keep things on track and moving forward.”

- Joel Bennett, Project Manager of Hoffman Skanska.

BENEFITS

Efficient Heating

A superior heating solution was provided because Polygon US understood the trade-offs between options, the requirements, and the limitations of the job and site, and kept project goals in mind.

Materials Protection

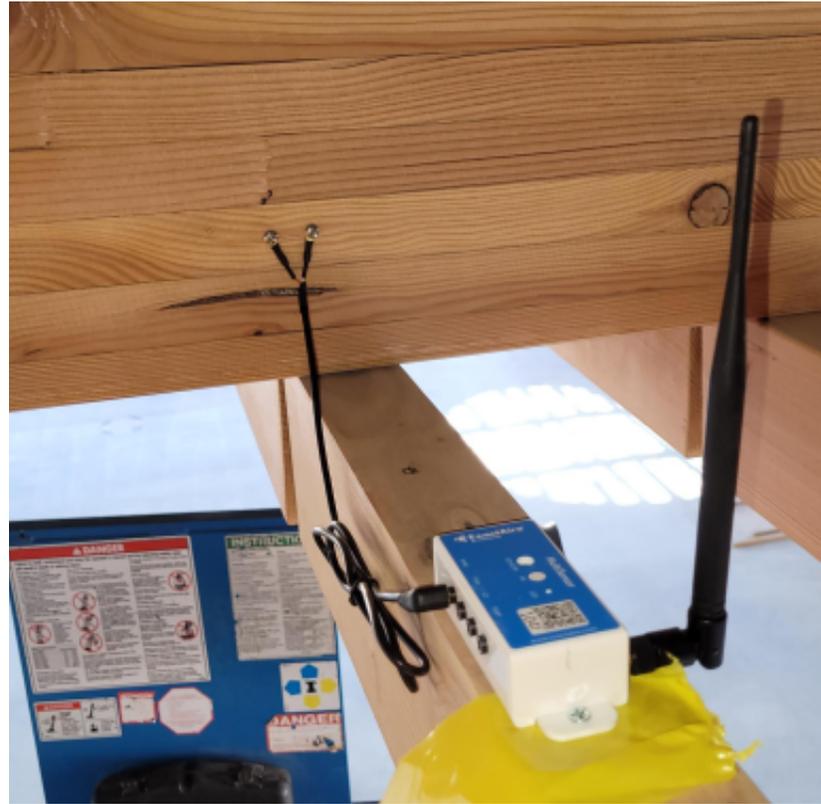
The combination of ExactAire and the right climate control reassured stakeholders that the proper climate conditions were being produced and they were able to communicate that information. This not only helped with managing schedule slips but also helped protect materials from poor conditions.

Documentation

The trend logging from ExactAire serves as documentation and verification for future reporting. Should anyone question what conditions were at a given point in time, the project team will be able to share those details both for the temperature and RH monitoring and WME readings.

The PDX Next project is expected to be completed in 2025.

For more information on ExactAire
Remote Monitoring services in Canada,
contact us at 1-888-702-4782.



SOURCES

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