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ENGINEERED TO PERFECTION: MOTAT AVIATION HALL

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PROJECT SPECIFICATIONS

PRODUCTS:

hySPAN[®], hyCHORD[®]

ARCHITECT:

StudioPacific

ENGINEER:

Holmes Consulting

FABRICATOR:

Carters

CONTRACTOR/BUILDER:

NZ Strong

As custodians of a unique and historic aviation collection, MOTAT needed to provide a storage facility that will house and display their heritage aircraft as well as providing for educational and reception areas within the new space to ensure an outstanding exhibition experience.

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The new hall, at over 2500 m², will be more than double the size of the existing facility. To hold the substantial weight of aircraft, both on the ground and suspended from the roof, involved precision engineering and quality materials. Custom designed from top to bottom, the structure of the hall is exposed Futurebuild[®] LVL hySPAN[®] columns and beams that span 42 m unsupported making it the largest clear span timber portal frame structure in New Zealand.

Although the decision to use timber was architecturally and client driven, the exposure of the Futurebuild LVL framework allows people to see how the building is held up and all its complexities, says Structural Engineer Lisa Wood of Holmes Consulting Group. "We worked particularly closely with the architects because a lot of the connections are exposed and they wanted to make sure the final look was right. Often the cross bracing connection is hidden within framing or cladding whereas in this case it is fully visible."

Stability was a major issue both below and above ground with the large build on a former dump site. Technical and environmental engineering work was done first resulting in a thick membrane and piping placed below the foundations to mitigate any risk of methane gas escaping.

From there Holmes Consulting Group confirmed with CHH Woodproducts (CHH) that the scale and type of materials they wanted to use were available. "We were able to use CHH and get some great advice throughout the process with material properties and ideas on fixing the timber together," says Lisa.

"CHH helped with the feasibility of what we were trying to do early on. Very large slender pieces of timber are prone to bending in ways you don't really want them to. CHH recommended we use cross bands with the Futurebuild LVL.

By adding some veneer at 90 degrees to the typical grain of Futurebuild LVL you give the individual piece of timber more stability." The flexibility of Futurebuild LVL in size and type allowed Holmes to create Futurebuild LVL based box beams to clear span this large open area.

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The 12 m vertical height accommodates the hanger doors that provide an opening of 28 m by 9 m and required some careful thought, said Lisa. "We had to design the end wall to fit the doors and the top support. Probably deflection was the hardest thing to work around.

A timber beam will deflect with a load on it and will continue to deflect a little more if you leave the load on it. It's not easy to quantify but like any design, you come up with a solution and do the numbers behind it to make sure it works."

Working with timber has also allowed for flexibility in future planning as internal framing can be fixed directly and easily to the Futurebuild LVL. Design features, too, reflect the versatility and natural beauty of wood with the apex of the portal offset the centre and two supporting columns rather than just one.

