

Allen Jack + Cottier • Sydney, Australia

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Allen Jack+Cottier (AJ+C) designed the Indoor Sports Stadium on Milson Island, near Sydney, Australia.

Photo: Nic Bailey/ Courtesy Allen Jack+Cottier

Allen Jack+Cottier (AJ+C) adopted an imaginative approach to materials, structure, and form when designing the Indoor Sports Stadium, located in rural New South Wales, on Milson Island in the Hawkesbury River, north of Sydney, Australia.

The project brief was to design a multi-purpose recreation hall for use by young children at camp. The firm undertook careful study of local conditions which resulted in a curving, lightweight building that seems to float over the landscape of its extraordinary natural site.

The form of the building is an overt and direct expression of thermodynamic analysis. Smooth airflow required a clean, crisp interior skin and the natural thermal ventilation patterns influence the building's wing shape. A combination of twelve wind turbines and a series of floor mounted louvres ensure the building remains cool in Sydney's fierce summer heat, and when closed in winter, act as an insulation blanket.



The main hall of the Indoor Sports Stadium. Photo: Nic Bailey/ Courtesy Allen Jack+Cottier

The building's shape was inspired by the traditional Arnhem Land canoe. These canoes were made from a single piece of bark, stripped from a Stringybark tree, seasoned over a fire and shaped by branches. Upright and propped off the ground, the canoe, in its frugality, demonstrated the essence of shelter.

The design responds uniquely to its location. The Hawkesbury River runs through a deep river valley which funnels air into an unusual wind pattern that takes a westerly shortcut over the island. The unusual asymmetrical curve of the hall arose from practical considerations of wind load, bushfire protection and maintenance. The main curve directs wind efficiently over the roof, while the indented curves at the base scoop wind inside to naturally ventilate the hall.



The building's facade features a low, continuous ribbon of windows. Photo: Nic Bailey/ Courtesy Allen Jack+Cottier

There are no visible ridgelines, eaves, gutters, downspouts, or skylights on the exterior. The building's shell forms a continuous surface that serves as both wall and roof. Eliminating building gutters reduced building maintenance and removed a major bush-fire hazard.

A structural frame consisting of galvanized and micaceous iron oxide (MIO)-painted primary steel framing members, and roofing material of marine grade Colorbond steel were specified to ensure the building is relatively maintenance free.

The design exploits the inherent properties of plywood with the shape of the building designed to unload wind forces on this exposed site, thus reducing the weight of the structure by 30%. The steel frame, in conjunction with one cross laminated plywood bay, carries all the wind loads of the 38-meter (125-foot) building to the ground. The hoop pine veneer applied to the roof panels comes from a rapidly renewable source. As a veneer laid on moisture-resistant medium-density fiber board (MDF), it is expected last the life of the building. These panels are both modular and reusable.

Sensitively Positioned

Inspired by the 'fantasy land' of the Australian bush on Hawkesbury Island, the firm was determined that this large building should slot itself 'gently' into the site and be subservient to its surroundings.

However, the fire department and other local authorities restricted where the building could be built, initially rejecting the firm's favored site. In response, the firm took the step of performing a highly detailed documentation of all the plant life on the site. By measuring every tree - both trunk and canopy - and for a few critical specimens, root and branch mapping, they were able to engineer the building to reduce its effect on the restricted fire zone.



The building is positioned within a pocket between two lines of trees. Photo: Nic Bailey/ Courtesy Allen Jack+Cottier

In this location, the building recreates the roll of a ridgeline which had been removed as part of an earlier quarrying operation on the site.

A Bushland Theatre

At night, the curved wing shape of the new building acts as a proscenium arch to define an exterior campfire space, an important part of each camp at the site. When the campfire is lit at night, and the hall interior is illuminated only by a strip of lights, the building seems to magically float in the surrounding bushland.

Attached amenities and storage modules service the fireplace, the bushwalking activities and the oval. They also serve to define a clear and strong entry space for the building.



The building serves as a proscenium for the outdoor seating area. Photo: Nic Bailey/ Courtesy Allen Jack+Cottier

Sustainability

Among the building's sustainable strategies are:

Natural ventilation - A combination of twelve wind turbines and a series of floor-mounted louvres circulate air through the building.

Water harvesting and reuse - Rainwater falls clear of the roof into oversized rock gardens where it is collected for use in landscape irrigation and toilet flushing.

Daylighting - Daylight enters the building from the roof windows, ground level slot windows, and end walls.



The Indoor Sports Stadium was recently recognized by the 2012 Australian Steel Institute (ASI) National Awards. Photo: Nic Bailey/ Courtesy Allen Jack+Cottier

Flexibility

The building brief was to provide a site-specific multi-purpose building to accommodate a variety of activities over its life. As such it can accommodate a large variety of internal activities including; sports, games, dancing, music, performance, conferencing, workshops, film projection, ropes challenge course and future indoor climbing walls.



Photo: Nic Bailey/ Courtesy Allen Jack+Cottier

The design of the entire building is modular, including the floor, walls, roof and service pods. It can be extended, reduced in size, or even moved with relative ease. This was particularly important for this remote location to ensure a high degree of work could be completed off site and shipped to the site in pieces and bolted together. Likewise the building could equally be unbolted and shipped away. The building was designed and wired to utilize a rooftop photovoltaic (PV) array.

Buildability

The building is accessed only by boat, so all building elements had to be barged across river to the site.

Given this relative isolation, careful consideration was given to all the materials that had to be transported to the site. The firm minimized the use of concrete footings by embedding steel posts in an existing rock shelf and used a steel-jointed floor system rather than a traditional concrete slab.



The curved roof of the building is supported by a series of prefabricated steel frames. Photo: Nic Bailey/ Courtesy Allen Jack+Cottier

Steel structural frames incorporate splice details to allow for the sections to fit on the barge.

Prefabrication off-site, for the most part, meant that the steel frame erection was completed in days, allowing the building's subcontractors to quickly move onto and enclose the structure, which in turn allowed the finishing work to be started quickly.

The project was completed on time and within the target budget.



Photo: Nic Bailey/ Courtesy Allen Jack+Cottier



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