Year: 2025
Location: Japan, Osaka
Program: Exhibition

Blue Ocean Dome

The pavilion at the 2025 Osaka-Kansai Expo aimed to raise awareness about preserving the bounty of the sea for future generations. Three domes of varying sizes, constructed from different materials – bamboo, CFRP (carbon fiber reinforced plastic), paper tubes –were united in a three-dimensionally curved surface.
Dome A is a 19m-diameter dome made from bent bamboo laminate. Bamboo grows rapidly and can be harvested within 3 to 4 years, yet abandoned bamboo forests cause significant environmental damage. As a solution, bamboo from Kochi Prefecture was split into narrow strips, steam-treated, then bonded and compressed into laminated panels. These 8mm-thick panels were bent and layered six times [8x6 = 48…] to form 48mm-thick elements, which were used to construct a geometric dome reminiscent of traditional bamboo craftsmanship.
Dome B is a large-span dome with a diameter of 42m, utilizing a CFRP gridshell structure. Japan holds a significant global market share for carbon fiber, the main material in CFRP. Despite the unstable ground conditions at the Expo site, which would normally necessitate piling even for temporary structures, the use of lightweight, high-strength CFRP made such ground improvement unnecessary, while allowing easy dismantling and minimizing industrial waste. CFRP pipes, 100mm in diameter and 5.6mm thick, were arranged in two layers at right angles, and joined using cable ties. Steel pipes, utilized as bracing members, were fixed so as to secure the non-combustible membrane.
Dome C is a 19m-diameter dome formed by a three-dimensional truss of paper tubes. Paper tubes with an outer diameter of 137.8mm and a thickness of 18.9mm were used on the outer layer, whereas paper tubes with an outer diameter of 114.3mm and a thickness of 18.9mm were used on the inner layer. These were joined using 300mm-diameter wooden ball joints made of laminated Japanese cedar, forming a space resembling a molecular structure. After the closing of the Expo, it will be reused as a facility for a resort hotel being developed abroad. The lightweight structure also facilitates transport.

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