

MARSDEN CROSS, BAY OF ISLANDS, NEW ZEALAND, 2013



Marsden Cross commemorates the place that became New Zealand's first missionary settlement, where Reverend Samuel Marsden preached his first sermon on Christmas Day 1814. Plenty of celebrations are planned to mark the 2014 bicentennial anniversary and Gurit was involved in the creation of an impressive new landmark, the Interpretive Centre.

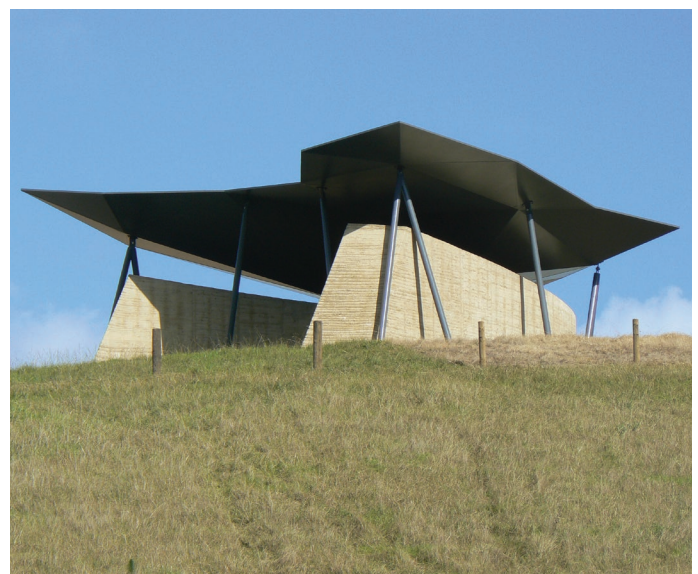
The Interpretive Centre is orientated directly towards the historic Cross where visitors can also walk down to. Its design is characterised by the contrasting curved rammed earth walls, symbolic of its grounding into tradition, with the thin triangulated composite roof, symbol of high technology, engineering and lightness.

Gurit was brought in to help the project managers meet the budget while achieving the modern geometric design and ensure the roof is structurally sound for years to come.

After extensive engineering analysis, using a parametric model to combine shape and laminate optimisation, a final epoxy infused laminate of E-glass / Gurit® G-PET™ 90 foam core was derived.

The architect, Pip Cheshire, wanted the engineering solution to drive the final geometric shape, not only because it was part of his design intent, but also because it was the only way to produce a design that would be buildable within a fixed budget. In close conjunction with Pip and the builder, Core Builders Composites, the engineers evaluated a number of design options, including additional structure, additional posts, and geometrical modification, in order to evaluate the cost benefit of each, and thus find the optimum solution.

In the end, the addition of posts along with geometrical modifications allowed for additional structure not to be used, and achieved the lowest cost. The geometrical modifications were devised thanks to the optimisation functionalities of the Altair Hyperworks software, which allowed for varying the heights of the peaks of the structure, concurrently with varying the laminate.



Definition of the material cost as a custom design variable within the software allowed for driving the optimisation towards minimising cost rather than the more usual objective of minimising weight. Finally an optimum was found between minimum material cost, and structural integrity, while realising the artistic intent.

One of the benefits of having chosen composite materials for building the roof is that Core Builders Composites was able to pre-assemble the roof in two large parts at their factory. These were then trucked to the construction site where they were joined into the full roof assembly, which was lifted as one piece onto the supporting posts, thus minimising installation time.

Gurit was initially engaged to start work on the project in May 2013 and installation commenced in October, resulting in just 5 months to engineer and build the composite parts. The architect is thrilled with the results and has made very positive comments about Gurit's involvement in his numerous public presentations of the project.

