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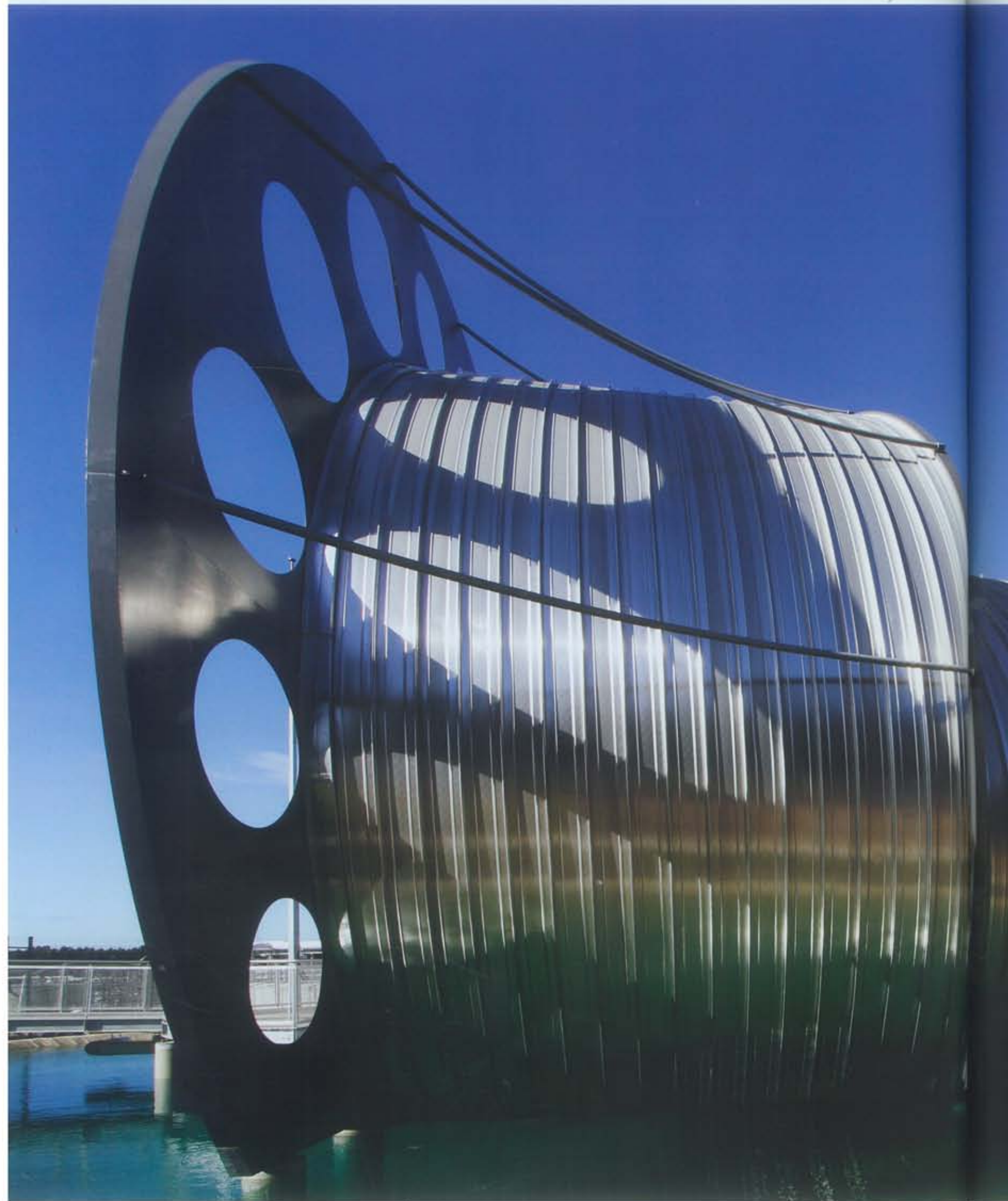
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ARCHITECT *DesignInc* WRITER *Toby Horrocks* PHOTOGRAPHER *Reflections Photography*

VORTEX WATER FACTORY

FUN AT THE FACTORY

THIS EYE-CATCHING CRUSTACEAN ENJOYS A SYMBIOTIC RELATIONSHIP THAT ALLOWS IT TO FEED OFF THE ENERGY AND PURE WATER OF THE GIPPSLAND WATER FACTORY

The Vortex Centre is a small building with a big presence. The budget was tight and the ambitions grand. The brief was to provide an educational display building adjacent to a large waste water treatment plant, the Gippsland Water Factory in Maryvale in south-east Victoria. DesignInc were also the architects for the whole plant, of which the Vortex Centre is the most 'architectural' building in a largely engineering-dominated design. During the design process, the budget for the educational facility was cut. Rather than make the building smaller and end up dwarfed by the large industrial complex next door, DesignInc pushed for the command centre, the laboratories and offices, to be incorporated into the building alongside the educational displays.



The building is inspired by nature – sea shells – and the spiral shape that water makes as it drains. It has a biomorphic feel to it, like a large crustacean has been washed up in the middle of rural Gippsland. The main visitors are school groups and there is something of a fun park about the spaces, like Queensland's Big Banana but more architectural and abstract. "They wanted a really bold, iconic thing that would really catch the eye because the plant itself is pretty massive," explains design director John Macdonald.

The shell is made up of seven interconnecting barrels that decrease in size. The largest end of the Vortex faces the access road and forms the main entry, presenting a very large circular facade to the public. Visitors enter via a curving bridge over an artificial pond. A vortex-within-the-vortex houses the labs and offices, and an educational display space occupies the intervening gap. Windows into the labs provide glimpses of scientists busy at work. The smallest end of the building contains the boardroom, which has a small circular window facing south.

The Gippsland Water Factory makes purified water from industrial waste water for re-use by industry. The water is purified by reverse osmosis and, having had all the salts removed, is too pure to drink. This very pure water fills the pond that the Vortex sits on, adding to the symbolism of the building and providing it with a stable temperature. In summer, the lightweight steel and recycled aluminium building is cooled by drawing water from the deepest part of the pond into heat exchangers, which cool the air. You can see the water between gaps in the floorboards, and it's between these gaps that water-cooled air is delivered. In winter, waste heat from the reverse osmosis process in the factory next door is used for heating. "It's like a parasite living off the plant to one side, a symbiotic relationship," says Macdonald. The public areas are all naturally heated and cooled in this way, while the

laboratory and office environment is controlled by minimal mechanical air conditioning.

To get the operational facility to work inside circular drums floating on water created design challenges such as corrosion and adhering to electrical cabling codes. The laboratory required an anti-vibration table. Made from concrete, its footings are independent of the building and reach 3.5 metres through the lake to the ground.

The windows at each end of the Vortex tube are made from plastic pillows pumped with a constant air pressure. The transparent polymer, called ETFE (ethylene tetrafluoroethylene), is lighter, safer and cheaper to install than glass. The ETFE pillows have three layers, two of which have a printed pattern of white dots that shade the light. The level of shading can be controlled by adjusting the pump pressure, which changes the gap between the dots.

The laboratory, office and control room feel like the inside of a submarine. Side windows in the metal walls are rounded like portholes, located between the ribs to maintain structural integrity of the cladding.

As a building and thermal system, the Vortex is not a standard model for future architectural developments. Rather, it is an example of making the most of specific site conditions. The bulldozers were already on site making the dams for the large Factory, so why not make an artificial lake? There was a steady supply of purified water available to keep the pond full, and waste heat is available from the Factory. These ingredients, combined with the didactic and symbolic requirements of the brief, created the circumstances for an unusual low-energy building. A raw, agricultural shed-like interior also suits the industrial and rural context. A sprayed-on layer of paper-based insulation is the internal finish to the metal drums. DesignInc tenaciously held on to big shape-making and sculptural effects, all successfully within the constrained budget.





FROM TOP: Curved aluminium cladding forms the shell; vast spaces for learning; labs are housed in the vortex-within-the-vortex; the level of shading afforded by the ETFE pillows is controlled by adjusting the pump pressure. **OPPOSITE:** The dramatic entrance to the Vortex.



IF IT LOOKS LIKE A DUCK ...

The expression 'duck building' was coined by architects Robert Venturi and Denise Scott Brown to describe architecture where the structure forms a symbolic expression. By this measure, The Vortex is a duck building – its design reflects the dynamic movement of water down a pipe.

But this duck building has an ironic problem – ducks. The thermal comfort of the public areas relies on an air seal formed with the surface of the pond so the facades dip below the waterline with rubber skirts. Native ducks have been diving underneath and nesting, and occasionally getting trapped under the building. The solution has been to float an inflatable shark and crocodile in the pond.

The Vortex has joined the ranks of other duck buildings around the world, including:



THE BIG DUCK

LONG ISLAND, US
A classic example of roadside architecture, the Big Duck in Long Island was built in 1931 by duck farmer Martin Maurer. It sold ducks and eggs from a shop in its belly.



NOTRE DAME DU HAUT

RONCHAMP, FR
Le Corbusier's chapel of Notre Dame du Haut has curved concrete walls and a roof that resembles a nun's wimple. Renzo Piano has recently designed a new addition to the site – a convent for the Poor Clare nuns who live on the grounds.



SYDNEY OPERA HOUSE

SYDNEY, AUS
The distinctive roof of Jørn Utzon's iconic Opera House closely resembles the billowing sails of the yachts that sail around it.



THE LONGABERGER HOME OFFICE

NEWARK, US
Dave Longaberger, founder of The Longaberger Company, commissioned the design of a giant picnic basket to house the corporate offices of the company. The building is made of stucco over a steel structure, which helps create the look of an actual Longaberger basket.



LEFT: Seven interconnecting barrels decrease in size to form the Vortex Centre's crustacean structure. Close-up detail of the light-controlling ETFE pillows.



PROJECT DETAILS

ARCHITECTS: John Macdonald, Mick Pearce, Wilson Heng
BUILDING SURVEYOR: PLP
CEILINGS: Off white recycled natural fibres from EnviroSpray
CONSTRUCTION: 23 months
CONSTRUCTION TEAM: Kane Constructions
DESIGN AND DOCUMENTATION: 18 months
ENTRY: Medium bronze pre-finished compressed fibre cement from Vitrepanel
EXTERIOR: Curved aluminium cladding from Kalzip
FACADE: Tensioned membrane ETFE from Vector Foiltec
FLOOR AREA: 650sqm
FLOORING: Recycled Mesmate timber boards from Big River
INTERIOR: Custom Orb Woodland Grey corrugated Colorbond sheet from Lysaght
INTERPRETIVE EXPERIENCE DESIGN: Pico
INTERPRETIVE EXPERIENCE ENVISIONING: CH2M Hill
PROJECT COST: \$5 million
PROJECT MANAGEMENT: Gippsland Water Factory Alliance
QUANTITY SURVEYOR: Davis Langdon
SERVICES ENGINEER AND ESD MODELLING: Umow Lai
STRUCTURAL ENGINEER: Winward Structures

