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ARCHITECTURAL

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EXTRACT



ARCHITECT Peter Stutchbury Architecture
PROJECT The Hangar
LOCATION Cessnock, New South Wales

Principal Corporate Partner



Australian Institute of Architects



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COVER PROJECT The Hangar
PHOTOGRAPHER Michael Nicholson



TAKING FLIGHT

The economy of form of The Hangar at Cessnock Airport, designed by Peter Stutchbury, doesn't detract from its beauty. The uniquely curvaceous building looks immensely at home in its airport setting, because its form is entirely derived from its function.

Words **Rachael Beersstone** Photography **Michael Nicholson**

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or a building of its size and modest expense, the Hangar at Cessnock Airport embodies a lot of design consideration and logical thinking. According to architect Peter Stutchbury, he worked hard at the outset to convince his client, property developer James Johnson, to build a landmark hangar. Once he'd done that, Stutchbury and his team expended considerable mental effort to realise the most efficient structure possible, on a tight budget. "It wasn't easy for us to fine-tune the design," Stutchbury says. "It was amazing how much design thinking went into the building, which cost about 20 per cent of the price-per-square-metre of some of the houses we design."

The project arose when Johnson, for whom Stutchbury had previously designed a house in Vanarua, started looking for a new location for his daylight business, originally based at Maitland Airport. "With just two or three aerobatic and jet planes, he was flooded with people wanting to fly, so he started looking for somewhere to set up a larger business," Stutchbury says.

The small regional airport at Cessnock—located close to the Hunter Valley vineyards and adjacent to the Tourist Centre—heard of Johnson's plans and opened up a parcel of land on a 40-year lease.

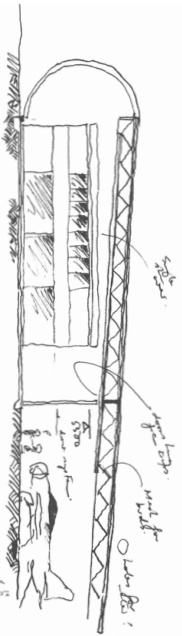
"The relatively short lease period made this a sizeable commitment on Johnson's part, and it wasn't easy to convince him that it would be in his best interests to go for an interesting building rather than just a standard shed," Stutchbury says. "We had to prove to him that our solution would be as cost-effective as a standard off-the-shelf hangar."

With an initial scheme in hand, Stutchbury commissioned a wind assessment from the University of Sydney to test the structural efficiency of the design, a process that cost \$12,000, but which he says saved five times that amount by helping to refine the design and reduce the building's steel content. "We were able to eliminate the building's secondary structure—there are no purlins or girts, and the primary structure, the portal frame—is made from only two types of standard steel sections," Stutchbury says. "The roof holds the whole thing together."

"Another advantage of our design is that it offers more hangar space internally than an off-the-shelf hangar would have provided, and we were able to achieve 25 per cent savings on the overall steel content in comparison with a standard hangar."

This feat was largely accomplished by the rounded southern elevation, which curves upwards to become the roof, concluding with a 12.5-metre cantilever on the northern elevation. The curved section acts like an aeroid to deflect the prevailing southerly winds—which can reach 100km/h—up and over the building. The steel roof is also slightly curved downwards from the centre to its eastern and western edges, to provide additional wind deflection.

"The two-way curve can be read subtly in the form, rather than as a dramatic statement, but it results entirely from function, to address the issues of wind loading and compression, and span," Stutchbury says.



The primary structural system comprises four curved trusses that incorporate roof brackets, so the roof cladding is directly attached to this frame, and the main portal frame on the northern elevation that provides the 30m span for the four sliding hangar doors to open to the taxiway. The roof sheeting—Aramax 800A100 G550 made from COLORBOND® steel in the colour Surfmat®—was rolled on site in 55-metre lengths before being strategically attached to the trusses.

"It wasn't straightforward to build because you don't have the secondary structure," Stutchbury explains. "It's only when the roof sheets are installed that the building becomes stable and structurally co-operative. We had to produce set-out drawings for all the brackets so that the builder could sequentially apply the roof sheets; it was quite experimental in terms of construction."

"Having said that, the erection of trusses and roof was completed within one week, so it was a quick build in terms of structure," he adds. "And we'd know where to save time and money if we were to build another hangar."

"We were able to eliminate the building's secondary structure—there are no purlins or girts and the portal frame is made from only two types of standard steel sections. The roof holds the whole thing together!"

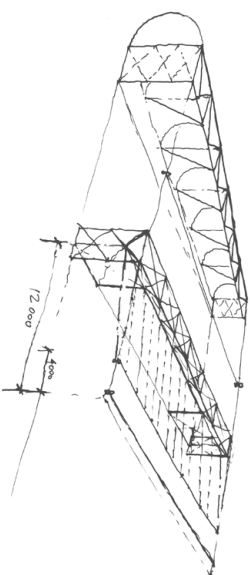
That may yet happen—Stutchbury says his office receives a phone call roughly every three weeks from potential clients whose interest has been sparked by the hangar, and the architects are currently considering a project for a Victorian airfield.

"We've had a lot of interest in the structural system that we developed for The Hangar, which eliminates the secondary structure," Stutchbury says. "It is not a common way to build and it provides an unusual solution because it achieves a significant cantilever in a location that experiences strong winds. The Hangar is designed to move 150 millimetres on the northern side; there is a lot of give in the building."

It's this attention to function and detail that sets The Hangar apart from Stutchbury's earlier works, including the Deepwater Woolshed near Wagga Wagga (which won the Australian Institute of Architects' National Commercial Buildings and COLORBOND® Award for Steel Architecture in 2005), which the architect says were largely inspired by and responded to their location and unique environmental conditions.

"The Woolshed was highly environmentally responsive, especially in terms of ventilation, because it provided natural distribution of heating and cooling," Stutchbury explains. "The Hangar does respond to environmental concerns, for example, it has sunshades to the west and the big overhang to the north, and cross ventilation at roof level to eliminate condensation, and it's made from lightweight and direct materials (the steel elements were affixed with screws and bolts so that the building can be disassembled and reused at any stage of its life)," Stutchbury says, "but it is more interesting for its structural and technological features' rather than environmental attributes."

"This project doesn't play on sustainable design elements as much as The Woolshed did, it's much more focused on structural problems and the notion of structural agility," he adds. "In fact, it took us months to evolve the structure using only two standardised steel sections, so that we could reduce the building's physical content down to just two or three main elements."



BELOW: The rounded southern elevation curves upwards to become the roof and acts like an aeroid to deflect prevailing southerly winds, which can reach 100km/h. BOTTOM: The steel roof is also slightly curved downwards from the centre to its eastern and western edges, to provide additional wind deflection.

PANEL SAYS

More than three years in the making, this is a project that we've been monitoring for some time, so we are extremely delighted to be featuring it in this 30-year anniversary issue. The Hangar can surely take its place among some of the most extraordinary buildings to have graced these pages over the past three decades, and we are convinced that it will become a quintessentially Australian architectural icon. While we admire the building's simple yet curvaceous form, the most noteworthy aspect of this project is the economy of the design and construction, which results in large spans while eliminating secondary structure, producing an honest and direct building that manages to somehow transcend the sum of its parts.



Another aspect that sets this building apart from previous projects is the fact that the wall becomes the roof – effectively the COLORBOND® steel is the building's entire skin rather than just its facade. That meant the architects had to consider design issues of tension and compression in the one surface for the first time. "In contrast, at the Woolshed, the roof is simply there, although it does support the structure below," he says.

The rigorous simplicity and structural economy of this design allowed few prospects for decorative touches. "In a budget this tight, there is very little opportunity for aesthetics," Stutchbury says.

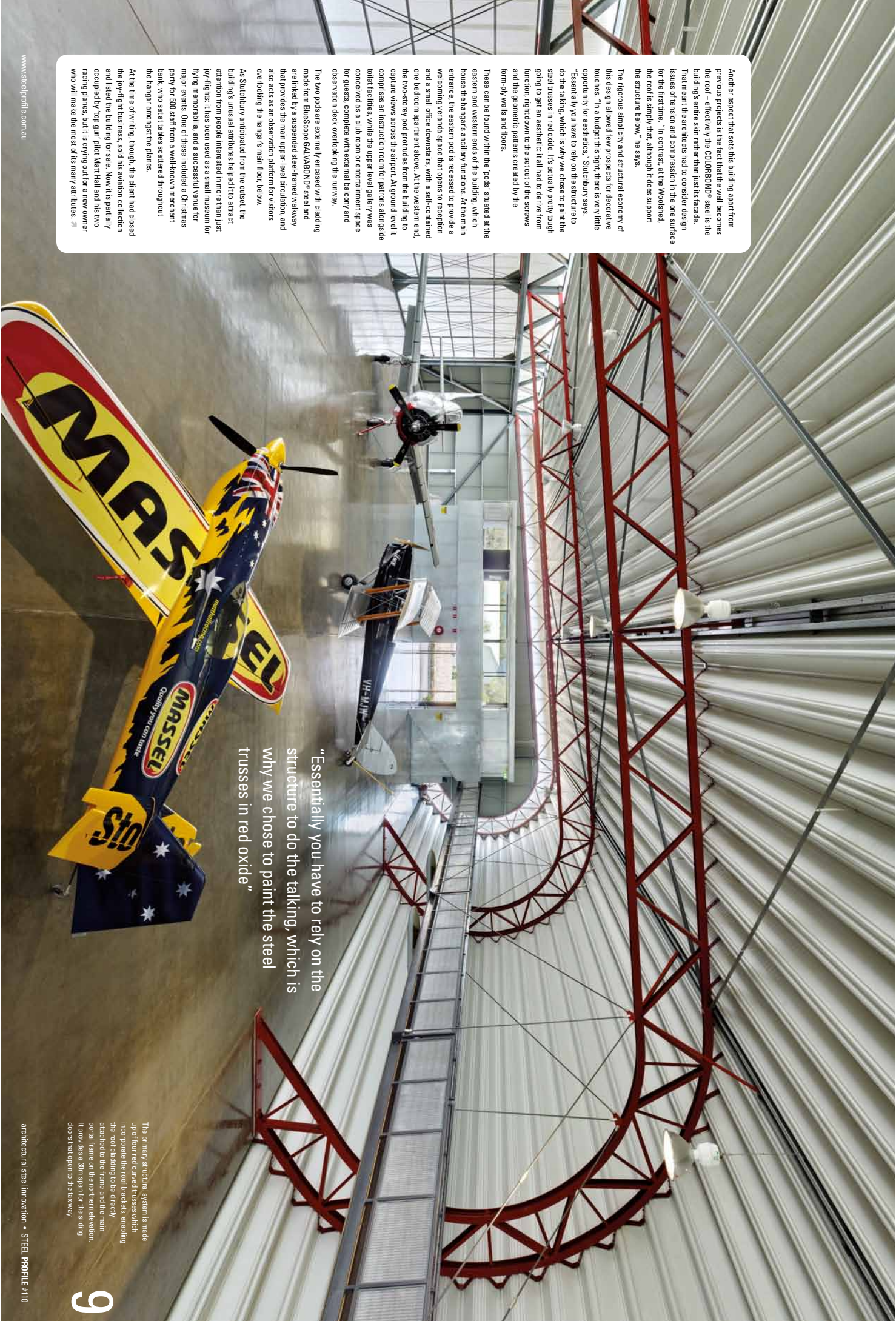
"Essentially you have to rely on the structure to do the talking, which is why we chose to paint the steel trusses in red oxide. It's actually pretty tough going to get an aesthetic. It all had to derive from function, right down to the set out of the screws and the geometric patterns created by the form-ply walls and floors.

These can be found within the 'pods' situated at the eastern and western ends of the building, which house the hangar's ancillary functions. At the main entrance, the eastern pod is recessed to provide a welcoming veranda space that opens to reception and a small office downstairs, with a self-contained one-bedroom apartment above. At the western end, the two-storey pod protrudes from the building to capture views across the airport. At ground level it comprises an instruction room for patrons alongside toilet facilities, while the upper level gallery was conceived as a club room or entertainment space for guests, complete with external balcony and observation deck overlooking the runway.

The two pods are externally encased with cladding made from Bluescope GALVABOARD® steel and are linked by a suspended steel-framed walkway that provides the main upper-level circulation, and also acts as an observation platform for visitors overlooking the hangar's main floor, below.

As Stutchbury anticipated from the outset, the building's unusual attributes helped it to attract attention from people interested in more than just joy-flights: it has been used as a small museum for flying memorabilia, and a successful venue for major events. One of these included a Christmas party for 500 staff from a well-known merchant bank, who sat at tables scattered throughout the hangar amongst the planes.

At the time of writing, though, the client had closed the joy-flight business, sold his aviation collection and listed the building for sale. Now it is partially occupied by 'top gun' pilot Matt Hall and his two racing planes, but it is crying out for a new owner who will make the most of its many attributes. ❧



"Essentially you have to rely on the structure to do the talking, which is why we chose to paint the steel trusses in red oxide"

The primary structural system is made up of four red painted trusses which incorporate the roof brackets, enabling the roof cladding to be directly attached to the frame and the main portal frame on the northern elevation. It provides a 30m span for the sliding doors that open to the taxiway

