



# house of card

IT'S BEEN CLOGGING UP OUR RECYCLING BINS FOR YEARS,  
BUT NOW SOME ARCHITECTS ARE TOUTING CARDBOARD  
AS THE BUILDING MATERIAL OF THE FUTURE.

*Writer Vanessa Murray Photographer Peter Tarasiuk*

WHEN TOBIAS HORROCKS WAS  
12 YEARS OLD, HIS PARENTS GAVE  
HIM A BOOK ABOUT HOW TO FOLD  
PAPER AEROPLANES.

.....  
It made a big impression.

He spent hours trying out different designs and seeing which ones flew best. But his new interest eventually landed him in hot water: he got kicked out of a shopping centre in Melbourne for perfectly landing one of his creations in somebody's coffee – from six floors up.

The scolding did little to extinguish the satisfaction he remembers getting from the planes. "They're quite amazing," Horrocks says. "Being able to take a thin, floppy piece of paper and fold it into a rigid, streamlined structure that can fly through the air is a small engineering miracle."

As an adult, Horrocks still has an unshakable interest in transforming seemingly weak materials into things that are sturdy. In particular, he's become an expert in working with a medium so lightweight that it's been largely relegated to the proverbial recycling bin of building design: cardboard.

Horrocks calls himself a 'cardboard architect'. His company, Fold Theory, is at the forefront

of exploring how corrugated paper could be used in the homes and offices of the future. It produces furniture, pavilions and other large interior structures.

Horrocks isn't the first one to think of crafting fittings out of cardboard, but he's definitely among the best. In 2013, a stool he designed won the unbuilt category at the ArchiTeam Awards, one of Victoria's premier accolades for emerging architects. The piece of furniture is deceptively simple – in fact, to the naked eye it kind of looks like something an online purchase would arrive in. It's put together in a similar way to origami: six different pieces of cardboard fold in on themselves and are slotted in place. It takes less than two minutes to assemble by hand, and can be connected to other stools to form an infinite number of geometric arrangements. The cost: around \$20.

Horrocks didn't exactly set out to become a cheerleader for cardboard. Before he started Fold Theory, he worked at one of Melbourne's biggest architecture firms, John Wardle Architects. He found the job a little creatively frustrating (it mostly involved creating two-dimensional graphics for partitions and facades), so he decided to design something for himself in his free time. Around the same period, he read something in an architectural magazine about the benefits of substituting

cardboard for plywood and MDF. Intrigued, he incorporated the idea into making a storage box. It worked; the box was strong, sustainable and easy to transport. He's been tumbling down a cardboard rabbit hole ever since.

And he's not the only one down there. There are a host of established architects around the world that share Horrocks's view that cardboard could become a vital building material in the future.

Peter Ryan of Per Architects in Melbourne spent the better part of a decade trying to get the idea of a mass-produced cardboard hut off the ground. "Cardboard is a great material," says Ryan. "It's just so under-utilised." His interest was first piqued when he came across a prototype for a cardboard coffin. He was impressed with its weight bearing capacity and began wondering about whether cardboard could be used to make disaster relief housing.

The most obvious hurdle was coming up with a way to prevent such a structure from melting into a pulp when it rained. So Ryan collaborated with the coffin's developer, Melbourne-based packaging giant Visy Industries, to design a set of weatherproof, fire-retardant cardboard panels. They ended up being the basis for a simple one-room structure that resembled an oversized tent.

>>

## “I KEPT HITTING A WALL WITH THE BUREAUCRATS. THEY JUST COULDN’T GET THEIR HEADS AROUND CARDBOARD.”

<<

“We chose the cardboard that they use for transporting oysters as the filling for the panel,” says Ryan. “We tested it and it could take the weight of a 120-kilogram tradie jumping on it without collapsing.”

The then president of East Timor, José Ramos-Horta, heard about Ryan’s plan and became excited about its potential applications in his country. He flew Ryan over, put him up in his own house, and had his brother-in-law show him around.

“They showed me a similar structure the locals make from palm fronds and bamboo – it was good, but bugs would come out of the palm fronds and annoy everyone,” says Ryan. “Horta and his brother-in-law were pretty keen, but I kept hitting a wall with the bureaucrats. They just couldn’t get their heads around cardboard.”

He eventually found other uses for the huts, even turning one into a cardboard sound studio for *Mad Max* film director George Miller. But after a while, Ryan became burnt out by the idea, and abandoned it.

It’s not particularly surprising that lawmakers were perplexed by Ryan’s huts. Cardboard is still in its infancy as an architectural material, and a lack of case studies means there are fundamental questions about it that are yet to be answered. A few of them are raised in a paper published by the Delft University of Technology in Holland entitled *Cardboard in Architecture*. Among the text’s many earnest-sounding headings is one dedicated to the basic question of how a cardboard structure could ever be safe from burglars. “Cardboard sounds like something you can just walk through, or at most use a Stanley knife,” the corresponding passage reads. “A chainsaw will also probably gain you access, but then again that is no different to a wooden house.”

The man at the centre of finding solutions for such issues is Shigeru Ban. The renowned Japanese architect built his first cardboard structure in 1990: a temporary house with a

fully functioning bathroom. “If you ran out of toilet paper, you could just tear off part of the wall,” Ban recently joked while discussing the building at a TEDx conference in Tokyo. “It was very useful.”

Over the following 20 years, Ban developed a reputation for consistently using cardboard tubes in groundbreaking ways. He successfully incorporated them into the creation of a temporary music hall in L’Aquila, Italy; a partition system for people in evacuation shelters, and even a Japanese hikers’ cabin.

Perhaps his most famous structure, however, is the cathedral he constructed in Christchurch after the 2011 earthquake. The giant A-frame is made from aligned cardboard tubes and a supporting steel and timber frame. It can seat 700 people, and is expected to last for upwards of 50 years; plenty of time for the city to decide what it wants to do about a permanent replacement for the 19<sup>th</sup> century stone original that once stood in its place.

Ban’s innovative approach is gaining more and more traction among his peers. In 2014, he won the architectural equivalent of the Nobel: the Pritzker Prize. But could the award actually mean we’ll be seeing more cardboard structures in the years to come? Nothing would delight Horrocks more.

“I really enjoy the hands-on side of cardboard. That’s something you don’t get to do, as an architect. You design, but you don’t build,” he reflects from his practice in West Melbourne, a space furnished almost entirely from cardboard. He sits on a cardboard stool behind a cardboard desk, with a shelving unit made from cardboard at his back. Another wall is given over to testing. Here, a blue jerry can weighing 10 kilograms is suspended from a cardboard partition wall. There’s one small, determined-looking succulent greening up the space, and even it is housed in a thin wrap of brown paper. Down the back are also a few piles of packaging supplies. That’s because anyone who buys from Fold Theory has their purchases shipped to them – appropriately – in a cardboard box. •