

MATERIALS

- Plastic mesh, 20 x 20 mm aperture, 10m x 0.6 m
- 'Water Lock' felt, 0.915m x 10m
- 2 x 1m 30mm aluminium angles
- 1m 30mm aluminium rectangle
- Fibre cement
- 4 x washer discs
- 4 x bolts (rounded top)
- 2 x bolts (hexagonal top)
- 4 x nuts (hexagonal)
- *Hypnum cupressiforme*

CONSTRUCTION STEPS

1. I measured 50cm x 50cm of the plastic mesh, and cut it using sharp kitchen scissors.
2. I measured 3 50cm x 50cm of felt, marked it with pen, and cut it likewise.



3. I marked out the 50cm x 50cm dimensions on the fibre cement.



4. My dad then, using a saw, cut the piece while I held the other end for stability.



5. He marked each 1m aluminium angle at 50cm, and used a different saw to cut them in half, using the clamp in the garage to steady it. This also occurred with the 1m aluminium rectangle.



6. To smooth the edges, I picked off any sharp pieces with gloved hands.
7. I laid all the materials together to see make sure they were all in proportion and fit together.
8. I then laid the fibre cement piece on 4 bricks and positioned the aluminium angles around the fibre cement board.
9. My dad drilled a hole through each corner of the panel and bolted it in place.



10. I laid the 3 felt layers over the panel, and, using the fabric scissors, made an incision where I poked through the bolt. I then fastened the nut and the locking nut to keep them in place.
11. I went to a rainforest in the Southern Highlands of NSW and pried moss off the rocks, then placed it on rolls of aluminium foil.



12. These were then watered and rolled up, with an air flow between the sheets, and transported home.



13. I placed the moss pieces across the felt, using a spray bottle to moisten it before I placed it on. I patted it down firmly and added extra layers to encourage the moss to attach to the felt.



14. My dad then, using a hand drill, drilled two bolts through the side of an aluminium angle and the aluminium rectangle to attach them together.
15. He then drilled 4 holes of 5mm diameter at 100mm intervals between the panel and the rectangle



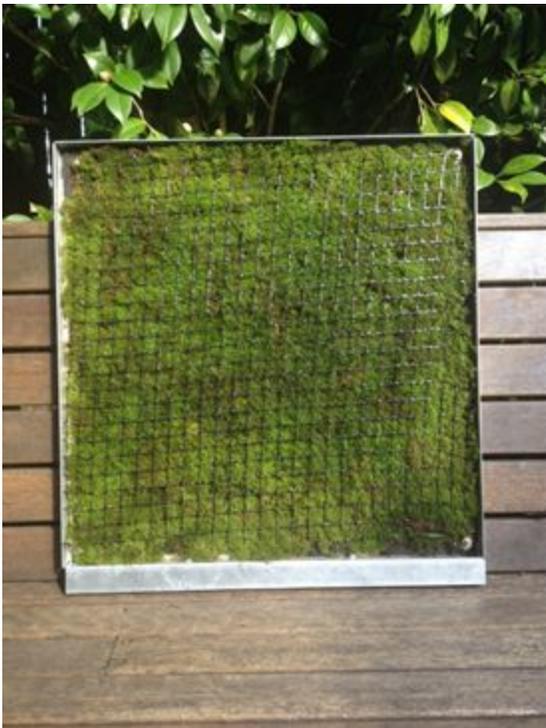
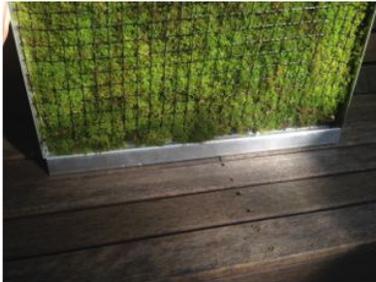
16. I then stretched the plastic mesh taut over the panel and hooked it underneath the nuts at each of the 4 corners

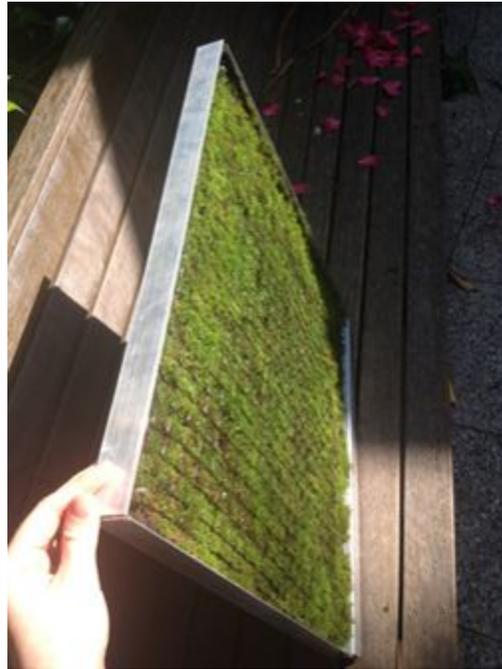


17. I then used kitchen scissors to trim the mesh that hung over the edge to make the panel look more pleasing.



Final photos





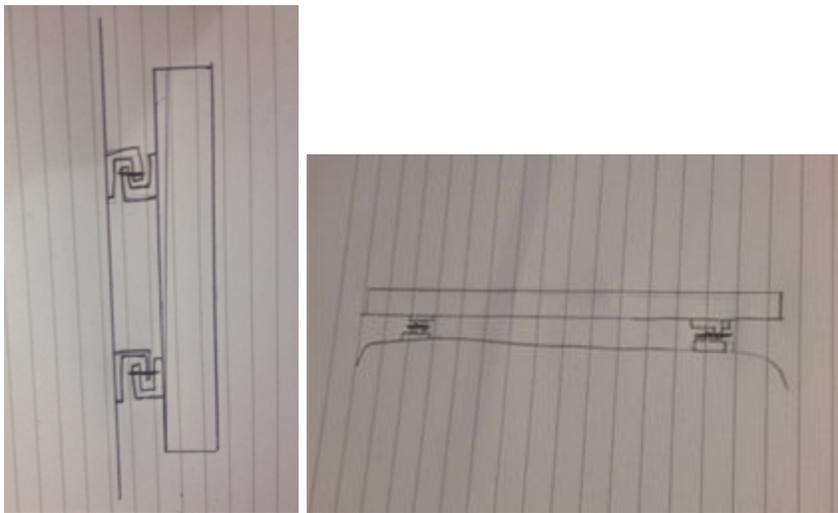
Risk assessment

Risk	Injury	Precaution
Injuring yourself with a drill or a saw while constructing prototype	Cuts or injuries to hands	Let an adult do this. They should take extra care to keep hands out of the way of the drill, and wear protective gloves
Cutting yourself on rough aluminium edges	Cuts or injuries to hands or exposed body parts	Take extra care to keep hands away from sharp edges, wear protective gloves, file away the rough edges on the aluminium
Cutting yourself on protruding nails	Cuts or injuries to hands or exposed body parts	Place a covering on any protruding nails, such as a nut
Contamination by soils or other chemicals in found moss	Sickness or poisoning	Check that there are no unusual signs or colours on the moss collected and wash hands afterwards

Overcoming problems/ Design process

Originally I wanted to put moss on street furniture, like a shop awning or rubbish bin. However, I realised that a system of panelling would be more flexible. The panels would cover a larger surface area if able to be installed on buildings, and a simple panel system means that moss could also shop awnings or even the roofs of buses. A panel system would also be easy to add to existing structures and easier to mass-produce and install.

I originally wanted to also have a system installed on the back of the panel whereby the panel could be attached to a wall or a similar surface. I then realised that it would limit where they could be installed to only vertical surfaces, and so I changed it as it needed to be flexible. I therefore decided to let there be optional installation systems, and to not add them to my panel. Possible ones are below (U-rail and T-rail):



My original designs also included an irrigation system of pipes running through the back of each of the panels. This was so that water and perhaps a nutrient-rich solution could be distributed to all of the moss. However, after further research, I have found that the species of moss I have chosen, *Ceratodon purpureus*, does not need high amounts of water and thus such a system would be rendered useless. Also, it would be too hard to create a system that gave the right amounts of water, with the right force (for example, in a mist spray), that also was aesthetically pleasing.

Another feature that was originally included in my design was a funnel system. The aim of this system was to shelter the moss panels from the rain, and thus channel any extra water down via a pipe system to a drain. It was important that the moss didn't get too much water at any one time, to prevent overhydration. However, they were all too large and conspicuous, a piping system was too hard to engineer. Also, most buildings already have an eave or gutter system so that the wall doesn't directly get wet, and so instead of creating my own system, I recommend that panels be installed under the existing eave of a building.

My original plans also included the depth of the panel as 50 mm, leaving over 30 mm for the moss to grow. However, I realised that this allowed for 6 times the average height of the moss species, and therefore that much room was not necessary. I thus reduced the width to 30 mm in total, and thus made the panel slimmer and more aesthetically pleasing.

Uses of the panel

The cities across the world with the highest air pollution levels that would benefit from introducing my product are:

- Zabol, Iran
- Gwalior, India
- Riyadh, Saudi Arabia
- Bamenda, Cameroon
- Delhi, India
- Cairo, Egypt
- Lima, Peru

Acknowledgements

My science teacher, Mrs Anderson, gave me guidance in choosing my idea for this project. My mother gave me advice as to how to fasten the panel to surfaces and suggested some sources where I found my information. My father assisted me in construction by using the saw and the drill. He also proofread my report for cohesion and grammatical errors.

(The credits for the photos in my video go to Google and their respective photographers)