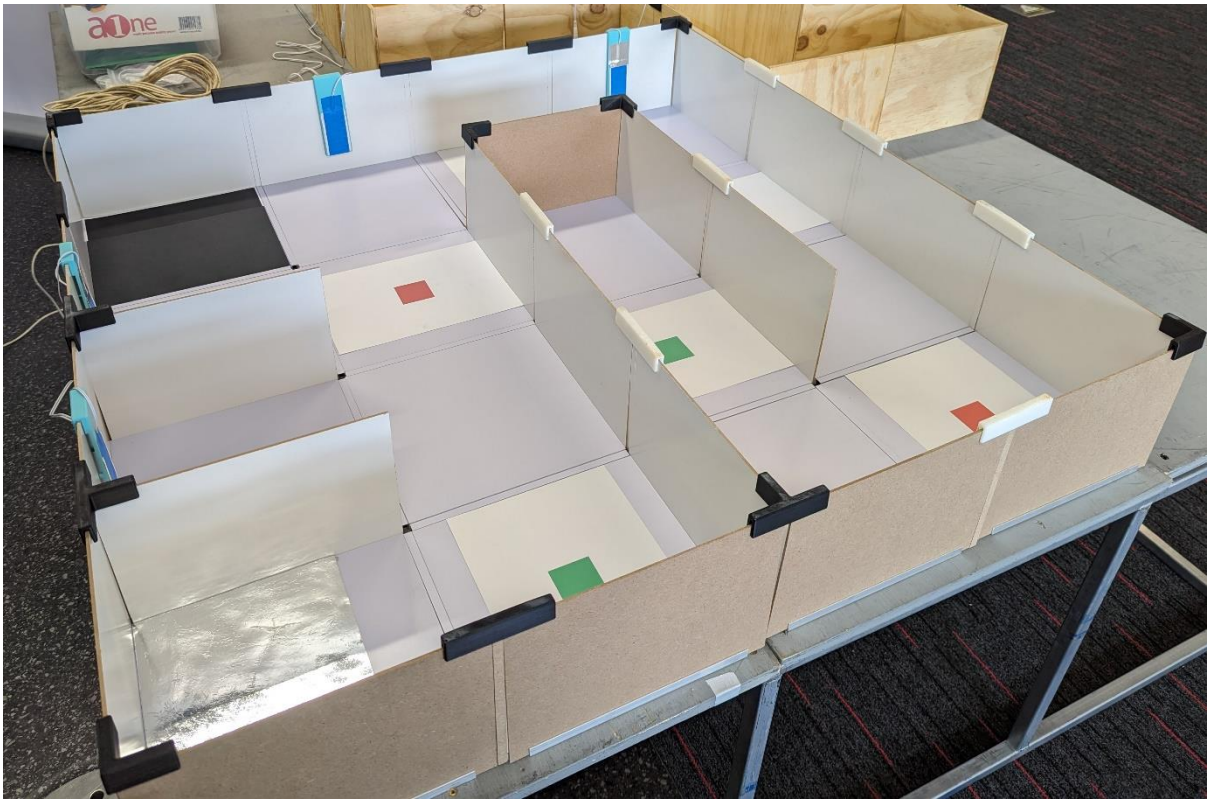
Robocup Junior Rescue Maze

Flat Pack Course Design

The Flat Pack Course Design has been created to allow for easy storage of Robocup Junior Australia Open Maze and Mighty Maisy Maze courses. It uses tiles with aluminium channels on their edges, allowing for walls to be slotted into place as needed. The channels formed where two tiles meet are covered over with a tile joiner. The walls are held in place with 3D printed joiners.

Here is an example course made with two 8 tile sets. This demonstration course has been set up with both victims on the walls for Open Maze and on the floor for Mighty Maisy Maze.



Instructions

The instructions below are for a set of 8 flat pack base pieces with 24 wall pieces. The parts have been chosen to make them easy to transport by not being too large. It would be possible to purchase larger sizes to save costs.

Tools List

- Craft knife/Stanley knife
- Hole Punch and hammer or auto hole punch (recommended)
- Small Phillips screwdriver
- Ruler
- Rubber Roller (Croc Grip Application Roller from Bunnings is perfect)
- Drill with 1.5mm, 3mm drill bits and counter sinking bit.
- Hacksaw
- Metal file

Parts List

• 1 x MDF Standard Panel Board 1200mm x 600mm x 12mm	$21.00
• 2 x Melamine MDF White Board 1200mm x 600mm x 3mm	$27.60
• 8 x Aluminium Angle 20 x 12 x 1.4mm x 1m (L shape profile)	$65.28
• 4 x Aluminium Channel 10 x 10 x 1.5mm x 1m (U shape profile)	$30.12
• 1 x Pack Timber Screws Hinge-Long Threads 4G x 12mm Qty: 100	$5.78
• 2 x Pack White Vinyl Adhesive Wrap Film 1.5m x 45cm	$11.14
• **Total:**	**$160.92**

The pricing shown is from Bunnings (April 2023).

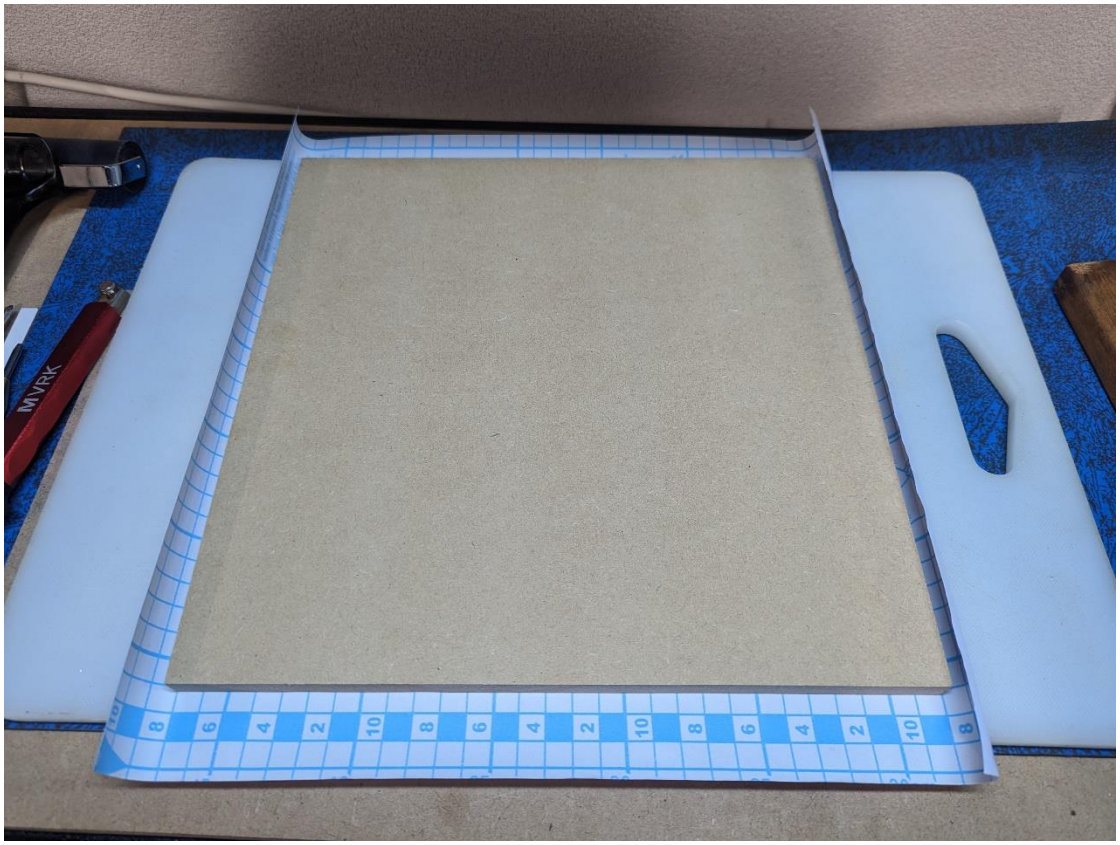
Cutting Base, Walls and Aluminium

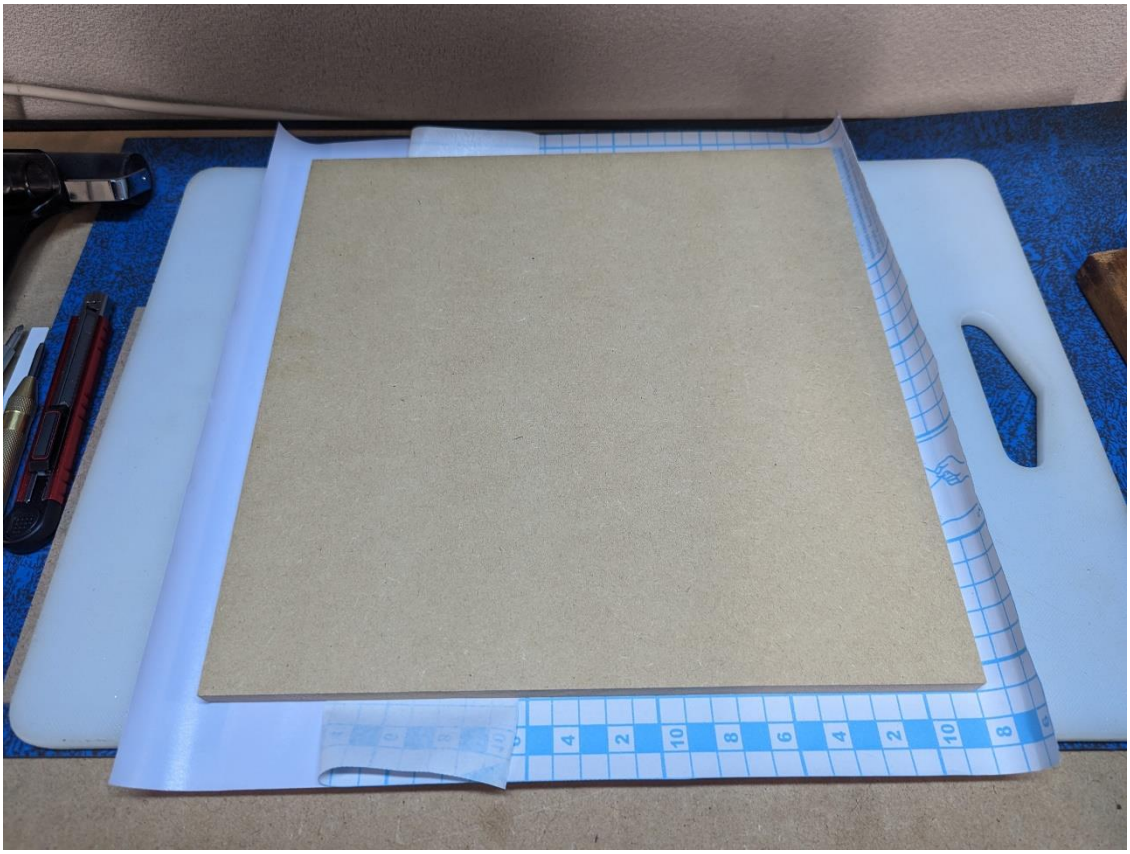
1. Cut the 12mm thick MDF board into 4 x 2 = 8 squares of 290mm x 290mm.
2. Cut each 3mm thick MDF boards into 4 x 3 = 12 rectangles 290mm x 200mm, cut excess into 10mm x 200mm strips (as many as possible, minimum of 6 from each sheet).
3. Cut each Aluminium Angle (L shape profile) into 4 x 250mm lengths.
4. Cut each Aluminium Channel (U shape profile) into 3 x 290mm lengths.

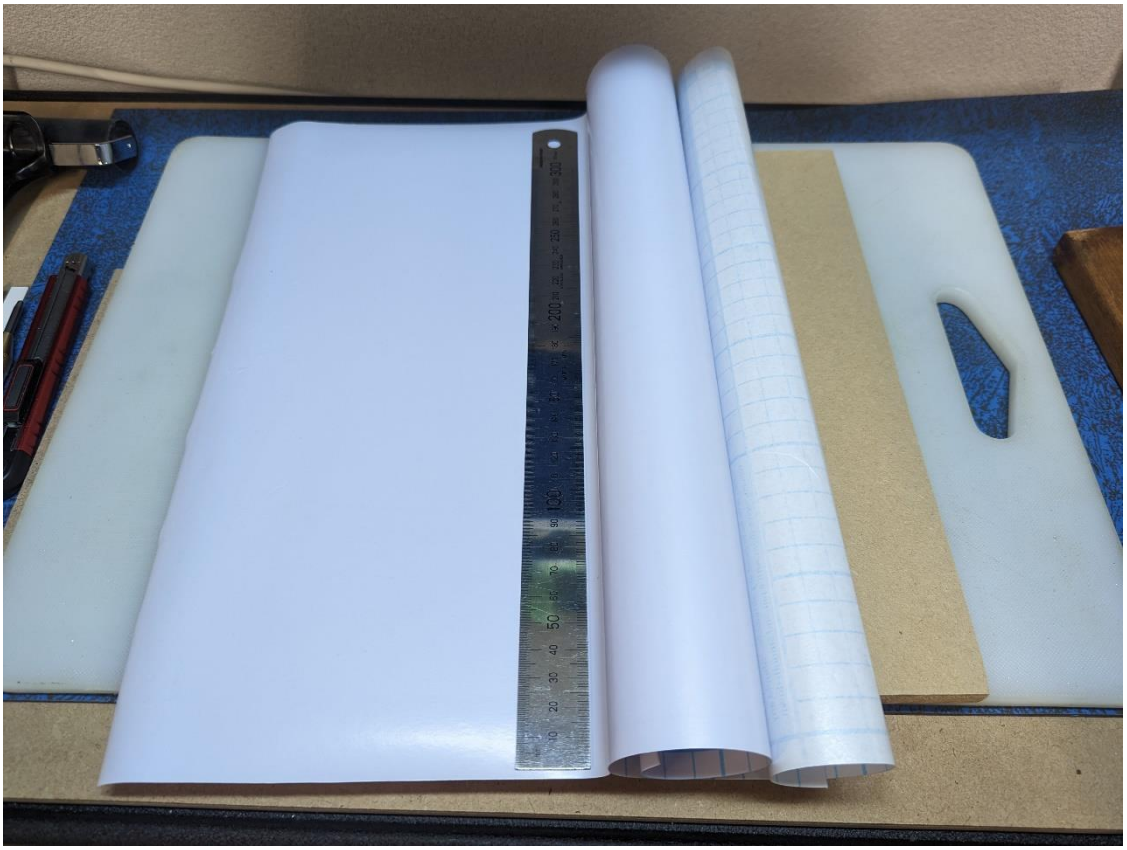
Finishing the Base plates

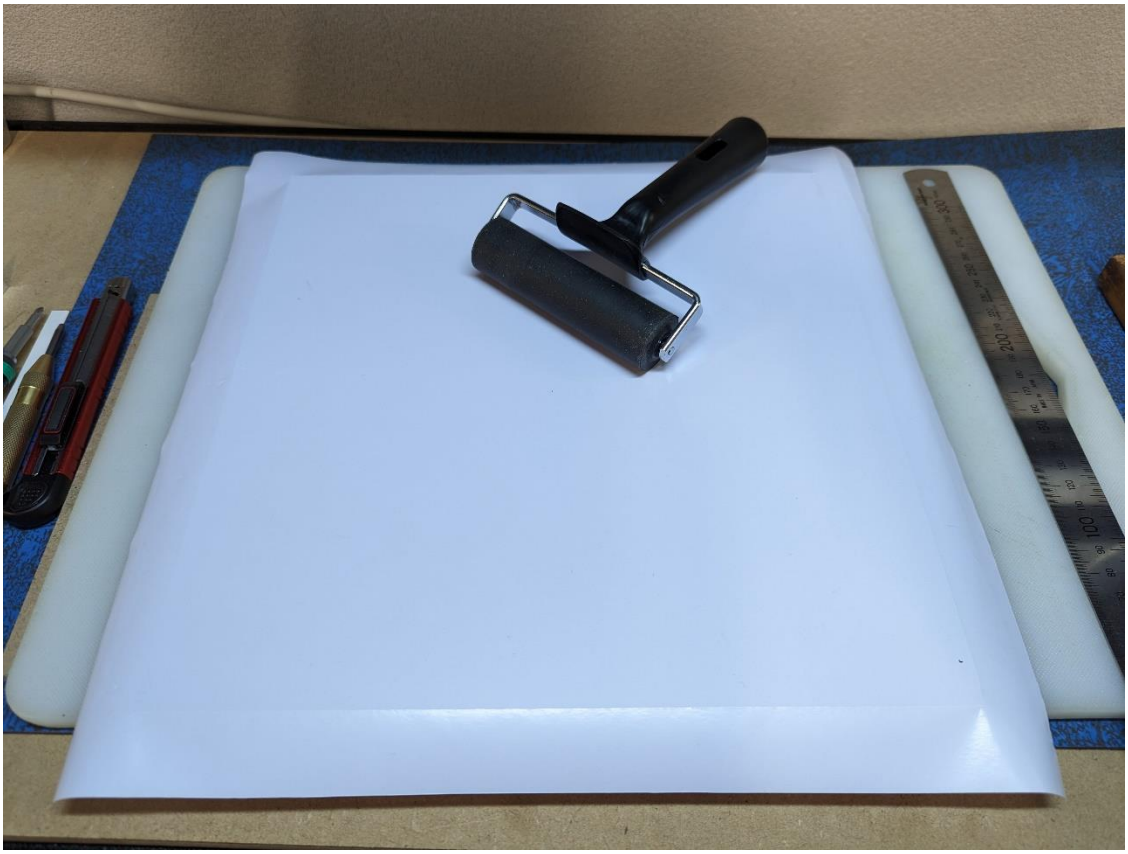
1. File ends of Aluminium to remove sharp edges (if necessary).
2. Using Aluminium Angle (L shape profile), drill 3mm holes 8mm from the edge of the long side of the L at positions 25mm, 125mm and 225mm.
3. Countersink drill holes on underside of Aluminium Angle (L shape profile).
4. Cut each roll of white vinyl wrap into four 350mm x 350mm squares. Keep excess to cut into strips to cover the tops of the 12 Aluminium Channel (U shape profile) sections.

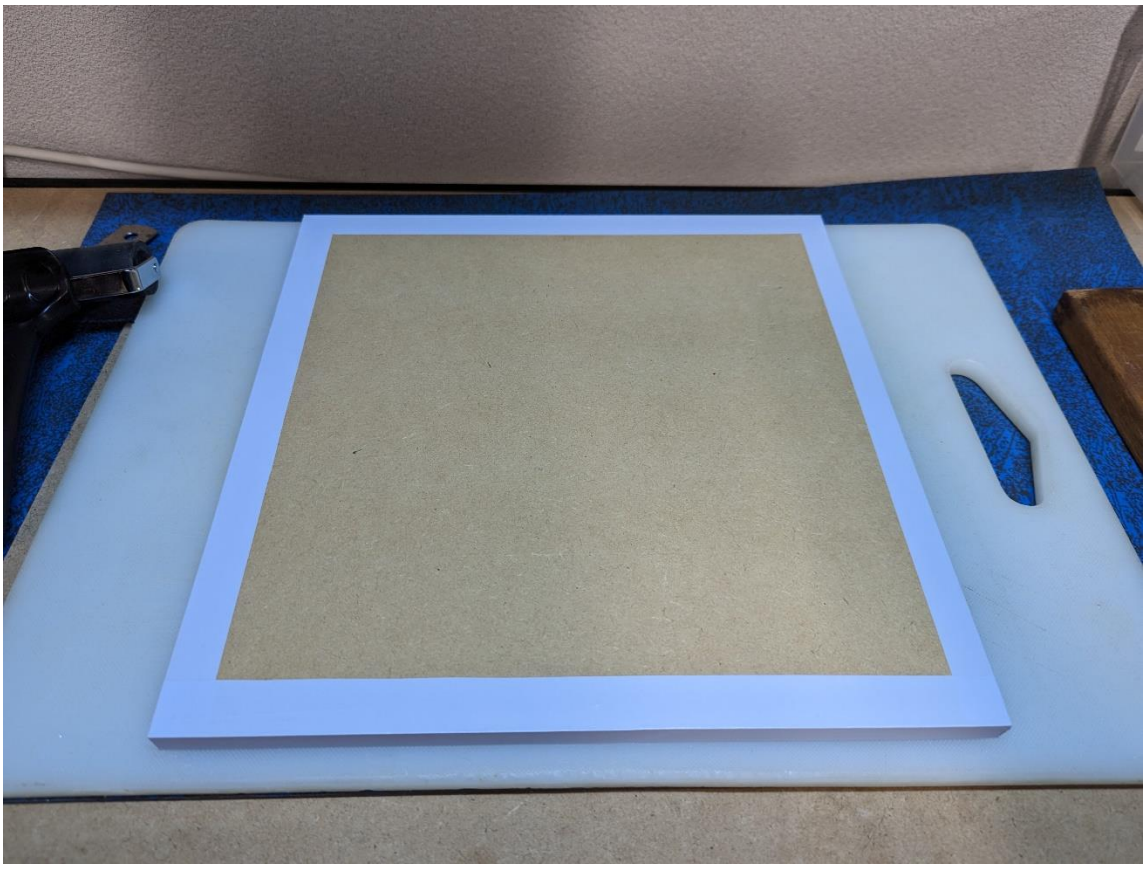
5. Cover top side of the base boards with vinyl wrap and have 12mm down sides and 18mm underneath. Use the ruler to smoothly apply the vinyl and the roller to ensure it has adhered fully as well as creating clean edges without bubbles. Use the craft knife to cut off excess vinyl on the corners.


WVRK

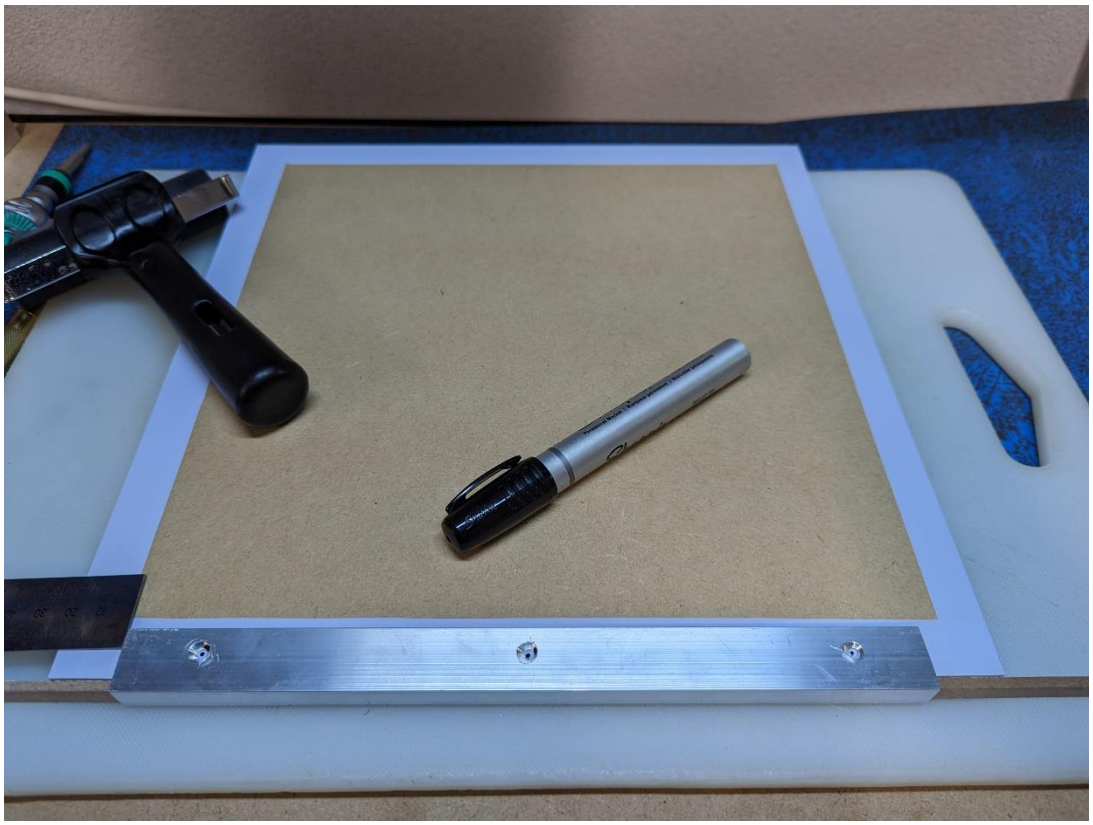


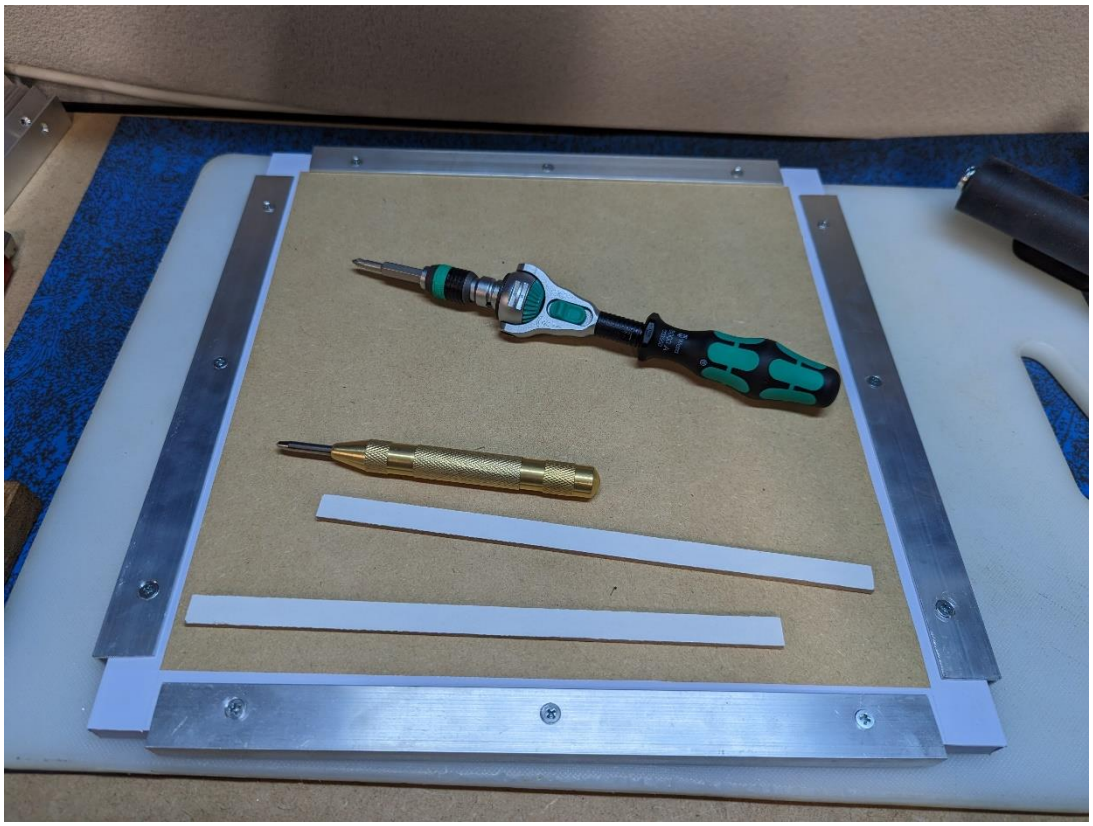






6. Using two of the 10mm x 200mm x 3mm wall section as guides, install the Aluminium Angle (L shape profile) to the sides of base boards centre aligned (20mm from edge of the board). Use a marker or hole punch to mark the location of the holes. Pre-drill 1.5mm holes and screw down the Aluminium Angle using the 4G x 12mm screws. **Note:** Be careful not to drill through the 12mm board & damage the vinyl.





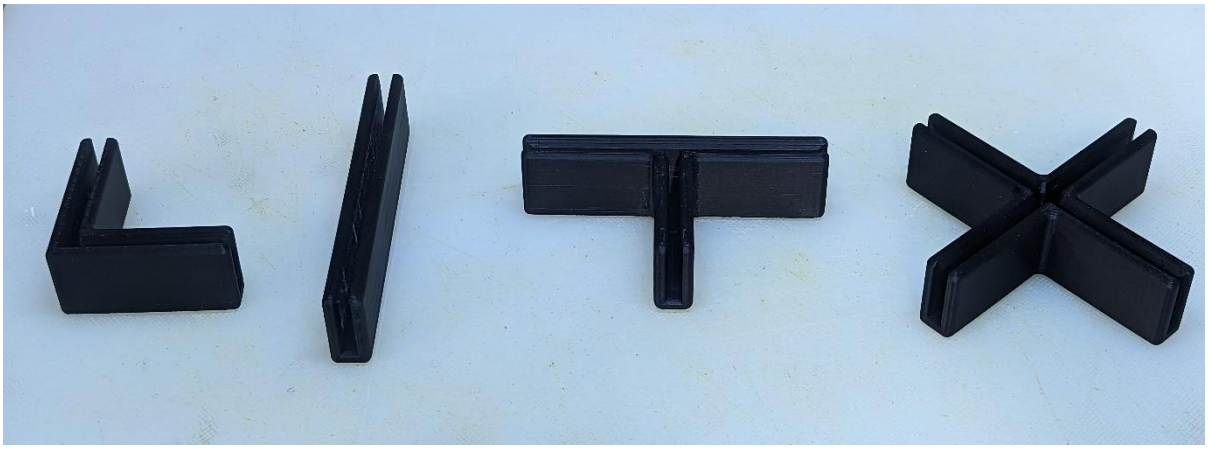
The base tiles should sit nicely side by side and the join can be covered with the vinyl topped Aluminium Channel (U shape profile) sections.

Storage of Tiles

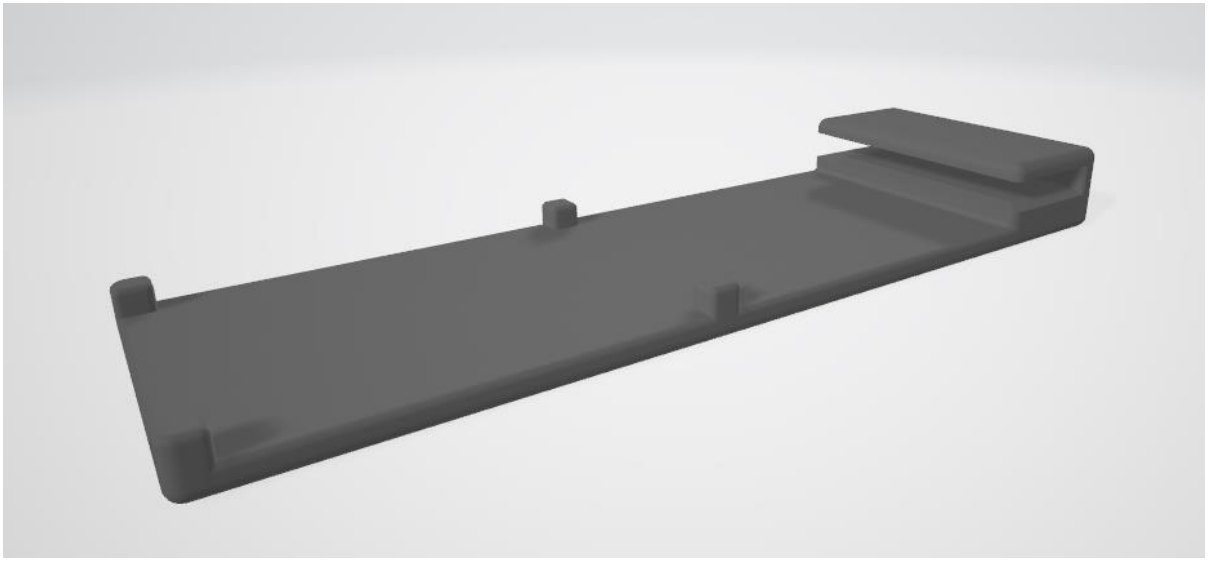
Ensure that the tiles are stored with the top side against each other to protect the vinyl being damaged by the aluminium on the base.

3D Printing

Print 3D designs for Wall Joiners L, I, T and X shapes. Print 12 of each of the L and I joiners and 6 of each of the T and X joiners.



Printing 3D design for victim hanger. Print 6 of the victim hangers. The hangers are designed to fit onto the walls and sit off the wall to minimize heat transfer to the wall itself.



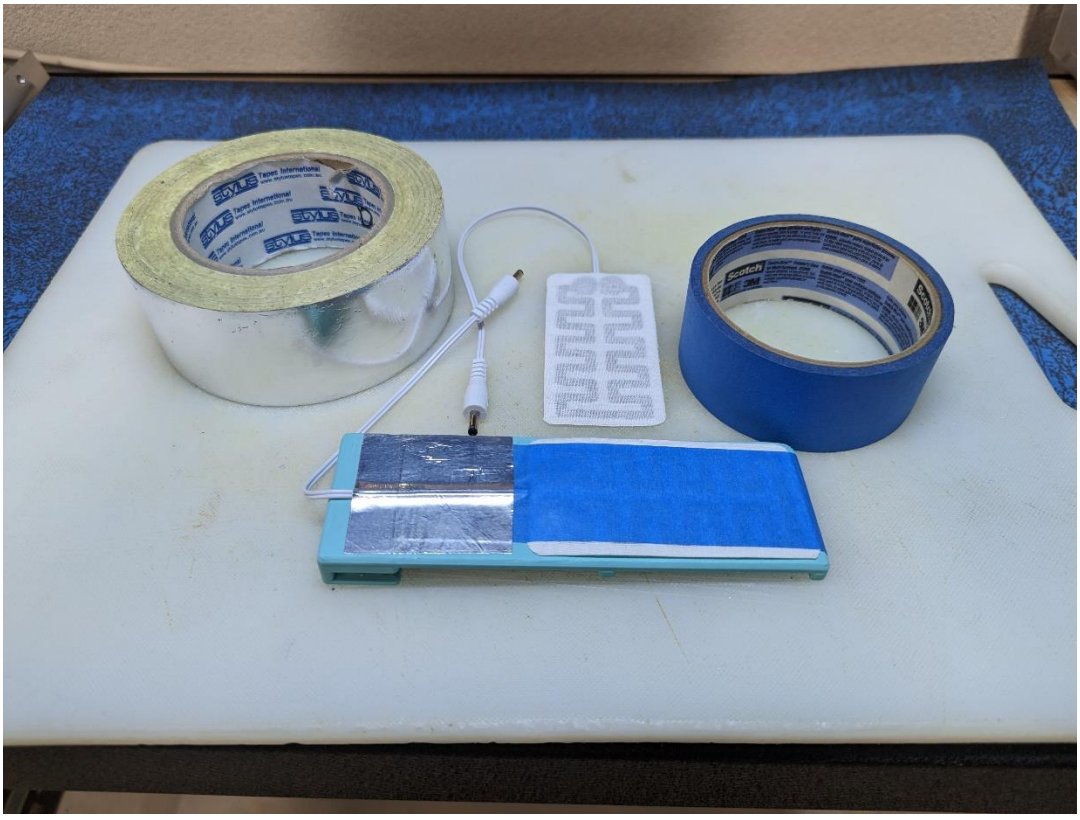
Assemble Victims

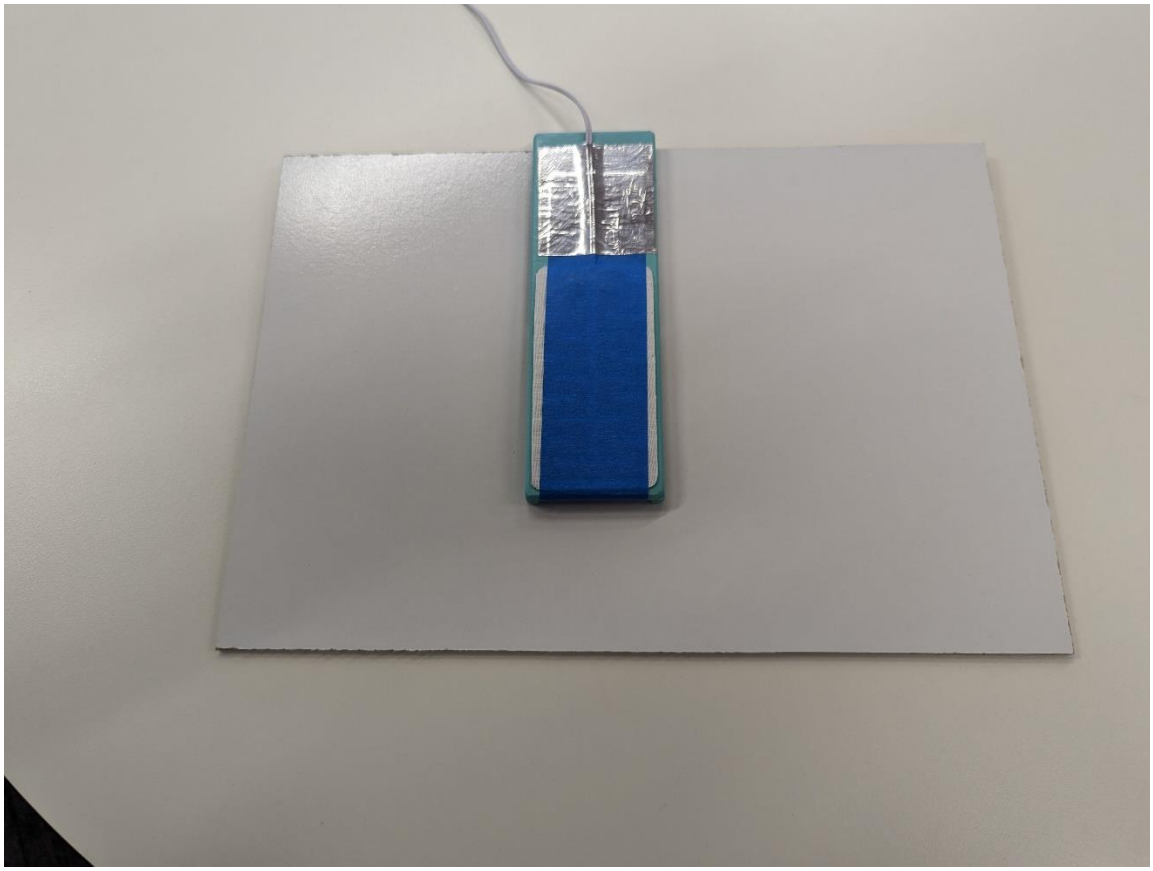
Victims have heated, coloured and reflective (optional, up to half of the victims) elements.

The coloured component can use 3M Blue Painter's Masking Tape (48mm wide) and the reflective component can use Aluminium Foil Tape (48-50mm wide). Both tapes available from Bunnings.

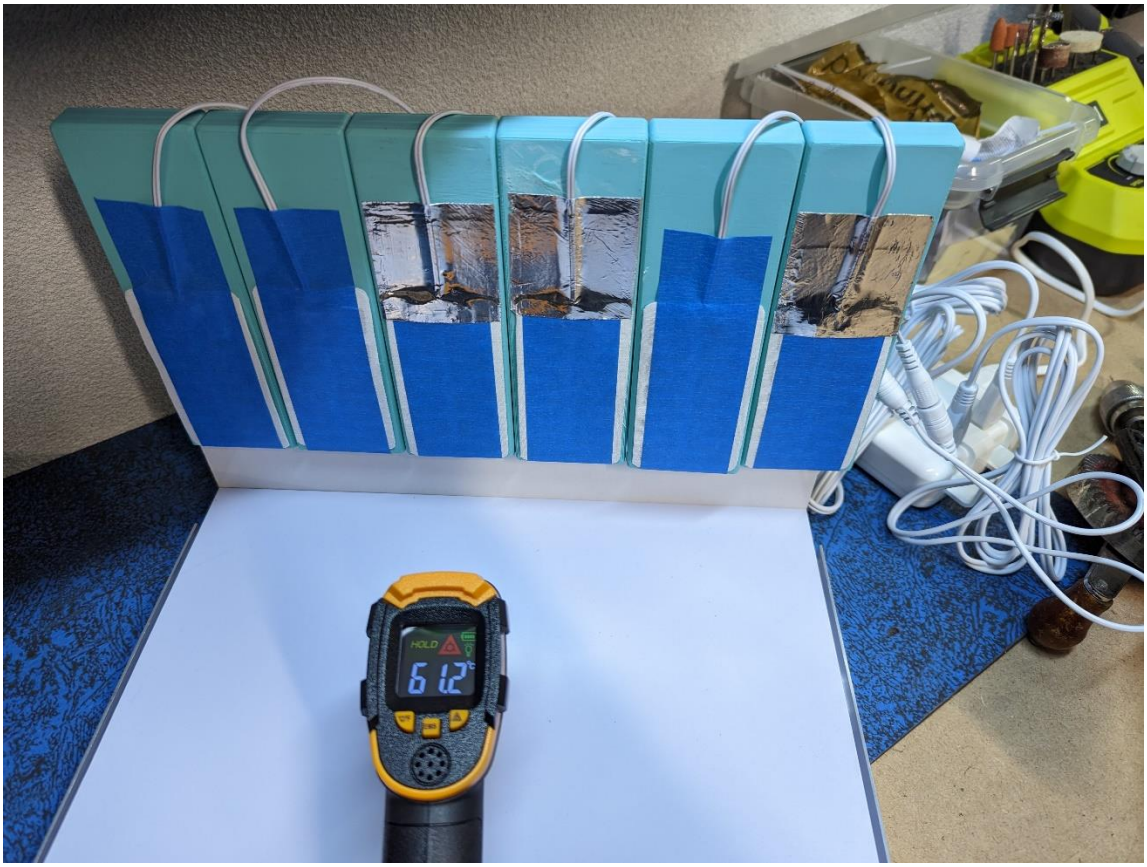
You can also use Duck Duct Tape in Neon Pink (48mm wide) available from Office Works.

The heated component is handled by USB Hand Warmers (90mm x 45mm) as shown below. They are easily obtainable from Australian sellers on eBay for around $11 for 2 pads (and cables for 1 USB port). Just search for "Carbon Fiber USB Heated Pads Gloves".





Testing of the victims shows that the USB Hand Warmers can reach above 60C.



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