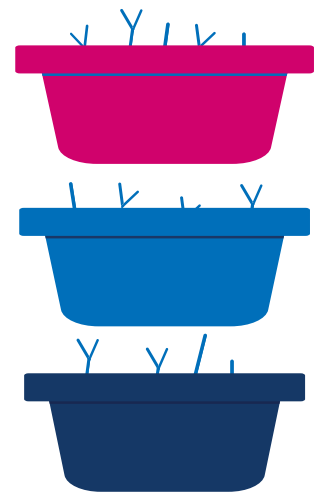


Vertical Garden

Completion time: 3-4 Lessons



Materials and Resources:

- Sheet MDF, approx. 1cm thickness
- Soil and plants
- Wood plane, disc sander, wood glue, sandpaper, tape measure and pencil
- Clamps, vice, drill and drill bits (5mm and 1.5mm)
- Drill and drill bits (5mm and 1.5mm)
- 8m of 5mm gauge rope
- Formech vacuum forming machine, suitable vacuum forming plastic material (1.5mm HIPS or ABS recommended)
- <https://formech.com/case-studies/formech-indexlab>

Skills at a glance:

Mathematics

Measurement, scale

Language

Discussion, reading, listening

Thinking skills

Interpreting a given brief, tool selection, independent thought, problem solving

Science

Heating plastics and effects, plastic/polymer material and plant life knowledge

Project Outline:

This project will see students create a series of identical vacuum formed planting trays, which when tethered together and filled with soil, will make for a beautiful vertical garden for use indoors or out, providing a basic space saving agricultural solution. This lesson is relevant for Food Technology lessons if the product were to be used to cultivate herbs, and also Science lessons with a focus on plant growth, photosynthesis and the like. The principal mould material will be sheet MDF, with tooling methods focussing on either machine or hand wood planes, and sanding.

Method:

Students must first consider how long their planter can be, dictated by the forming area size of the available Formech vacuum forming machine. Students can begin to make their mould ensuring that it is a minimum 3cm shorter than the maximum length the vacuum forming machine will cater for. Students must cut, layer and glue sheets of MDF to create one long rectangular block. The dimensions of this block can vary, but should always be wider than it is tall to ensure the finished product balances evenly when hanging.

On each end of the MDF block, students must draw a semi-circle, ensuring that they are both oriented the same way. These will act as guide lines as the block is shaped length ways into its final form, much like the shape of guttering.

With the MDF firmly secured in a vice, students may now run a hand plane down the length of the block, shaving off strips of material, adhering to the semi-circle markings at each end. This can be repeated until the block is semi-circular in shape. The mould can now be sanded to a smooth finish.

Students must now apply draft angles to each end of the mould. These can be applied using a disc sander.

The mould is now complete and can be vacuum formed. Complete the vacuum forming at least four times, producing four identical plastic trays. These can now have the excess plastic material trimmed off.

Each tray must now have four 5mm holes drilled; one in each corner, which will align perfectly when the four trays are stacked on top of each other. These will be for rope to be fed through so that the trays can be hung vertically.

Homework Tasks:

This project centres around the planting and nurturing of plant life both indoors and outdoors. The finished product is designed to be functional, but this also depends upon the correct selection of plants depending upon where the vertical garden is intended to be hung, as well as the correct care for these plants. Research on plant selection and care can make for a fantastic homework task.

Extending upon the theme of vacuum forming being a tool used in agriculture, perhaps students can be tasked with finding more examples of the technology being used in this field, for example, with hydroponics etc.

Optional Extras:

This project when followed produces very uniform and functional results with little or no artistic embellishment. These vertical gardens are designed with functionality in mind, but there is no reason why students can't incorporate some interesting and eye-catching elements into their mould design. Once the mould has been produced as per the method outlined, students might demonstrate other tooling techniques, and add aesthetic detail to the mould which will be both eye catching and artistic, whilst also showcasing their skills in other areas of their expertise, and ability to expand upon a given brief.

Method: (Continued)

Drainage holes will need to be drilled along the bottom of each tray to allow for water and air flow along the length of the underside of the trays. These should be 1.5mm in width and at 1.5cm intervals.

The trays are now ready to be hung using four lengths 5mm gauge rope. Each length of rope will need to be 2m long. Tie off the bottom of each piece of rope with a strong knot for the bottom tray to sit on, and thread the ropes through each corner of one tray, pulling them through until the knot is reached. This provides a solid base and bottom tier of our vertical garden.

Measure 25cm up the length of each piece of rope, and tie four more strong knots for the next tier of the garden to rest upon. Thread the next tier of the planter onto the rope and slide it down until the knots are reached. Repeat this process for all the remaining tiers.

Students will now have a completed product, with excess rope at the top, ready to be hung securely where desired. Once safely hung, students can now fill their planter with soil and add their plants of choice. Hanging plants are recommended for a full visual effect.

Student Accomplishments:

- The production of a functional vertical garden for use indoors or outdoors
- Demonstrating capabilities with wood planes, disc sanders, and a variety of drilling equipment
- Utilise and demonstrate a variety of different skills and tools within the workshop
- Using MDF as a principal material
- Practical hands on experience using a vacuum forming machine, and understanding its wider application
- Interpret a design brief accurately and creatively

Teachers notes:

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