



Laptop and Tablet Case

Completion time: 3 Lessons

Materials and Resources:

- Sheet MDF or wood approximately 1cm in thickness
- Pencil, ruler, craft glue, string, card, and thin sheet foam
- Sawing tools, disc sander, sand paper
- Drill press and various drill bits
- A length of strong fabric material, a zipper of adequate length
- Glue suitable for use on HIPS plastic (cyanoacrylate or 2 component epoxy)
- Formech vacuum forming machine, 1.5mm ABS, or other suitable plastic material
- <http://formech.com/case-studies/formech-check-kayak-accessory-manufacturers-berley-pro/>

Skills at a glance:

Mathematics

Measurement

Language

Discussion, reading, listening

Thinking skills

Design, following a prescribed brief, material selection, tool selection, independent thought, problem solving, research and development

Science

Heating plastics and effects, plastic/polymer material knowledge

Project Outline:

Students must design and make a hard case which can safely transport their laptop or tablet, protecting it and keeping it scratch free. A great project for students, as the finished product is something very functional that they can utilise every day, and can carry with them as an example of what they have produced in class. The principal mould material will be sheet MDF or wood. The case will comprise of two vacuum formed pieces of plastic, connected with thick fabric material down one side to allow it to open like a book, with a zip running around the remaining 3 sides to allow it to be closed securely with the device inside.

Method:

Students must first decide which electronic device they wish to make a case for and obtain measurements of its length, width, and height to guide them in the design process. Be sure to check that these dimensions are within the parameters of the forming area of the vacuum forming machine.

Students must cut a sheet of MDF or wood to a suitable size to begin making their mould. This one mould will be used to make both sides of the vacuum formed case. This sheet must be 2.5cm longer and 2.5cm wider than the size of the device, and ideally thinner than device itself.

Students can now begin shaping this into their desired mould. Firstly, they will need to apply draft angles to all four outer sides of the sheet using a disc sander. All harsh angles and corners can also be softened and rounded using sandpaper.

To add simple detail and decoration to the mould, students have a range of options available to them. They can use a pencil to draw a design directly onto the wood material, perhaps including their name, favourite sports team or musical artist as a theme within their design. Students can now make this design visible using a variety of methods. They may choose to apply glue to string or card, and secure it to their mould along the pencil lines of their design to achieve a 3D effect.

Alternatively, students might also utilise a drill press to carve their design into their mould. Laying their mould flat on the table of the drill press, and dropping a rotating drill just 2mm into it within the lines of their design, they can now move the mould around the flat surface, removing material using their lines as a guide. Once complete and rough edges have been sanded by hand, students will have a negative image of their design. 1.5mm venting holes will need to be drilled through the mould at 2cm intervals, within any recesses milled using the drill press.

Homework Tasks:

This project sees students begin the design process by tooling their sheet MDF or wood material to a suitable size, and with draft angles. With correct instruction relevant examples provided, students might be tasked with applying 3D detail and design to these moulds at home, taking time to make them intricate, eye-catching, and individual. This can be based on independent research, development of existing ideas, and utilising a whole range of additional craft materials which are suitable in the vacuum forming process.

Optional Extras:

This project is framed with the idea of students taking finished items home to use, but there is certainly scope to complete this project with school laptops and tablets in mind. There will undoubtedly be devices around the school, or in classrooms that would benefit from cases such as these. Inviting I.T. and Computer Science students into the workshop to get involved is a great way to engage the students in cross-subject learning.

Method: (Continued)

This mould can now be vacuum formed, twice, to produce the two sides of the device case using 1.5mm HIPS material. Any excess material can be trimmed off the newly formed parts.

Students must cut some strong fabric material to the length of their case, making it at least twice as wide as their mould was high. This will be glued along the inside length of both panels, allowing it to open, much like the spine of a book.

The moulded plastic sides can now have a zip added around the 3 remaining sides to allow it to be closed securely. Selecting a zip of adequate length, this can be glued to the inside of the 3 remaining sides, just like the fabric hinge previously.

The final stage is to line the device case with a layer of thin protective foam, cut to size and neatly glued in place, covering all of the previous glue lines and providing a professional finish. Having had time to dry, the case is now ready to be used, enjoyed, and travel wherever it might need to go.

Student Accomplishments:

- The production of a laptop or tablet case, for everyday use
- Demonstrating capabilities with saws, disc sanders, and a variety of drilling equipment
- Utilising and demonstrating a variety of different skills and tools within the workshop
- Using MDF or wood as a principal material
- Drawing upon individual knowledge of additional suitable materials
- 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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