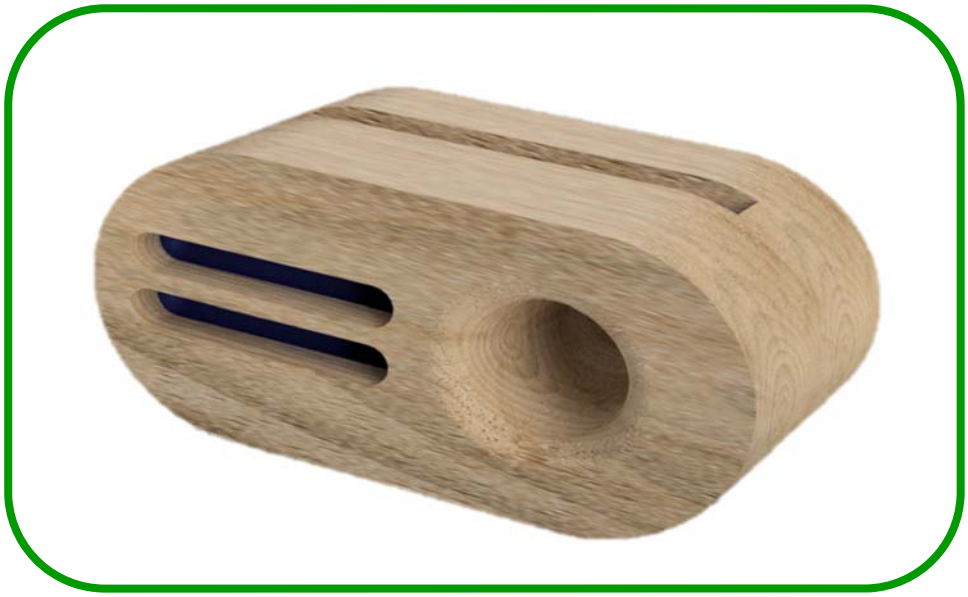
DENFORD®

CAD/CAM Projects

Passive Speaker Dock Project



TEACHER SUPPORT GUIDE

Denford: Passive Speaker Dock Project - Denford CNC Router
Teacher Support Guide

This Project takes the form of design and manufacture of a saleable product. Students are tasked with designing and making a passive speaker dock for a mobile phone or small MP3 player. Students have free reign on the shape and function of the design.

The only limits are that the dock must be manufactured using maple wood on a Denford CNC Router, and the design must be made in 2 halves and glued together when finished.

Project Timeline Summary

It is anticipated that learners will spend a total of approximately 8 hours in producing the work for this project (each session being around 1 hour). Learners will be expected to have had previous experience in using QuickCAM 2D design software.

Throughout this project, learners will need to apply problem-solving and designing skills, developed in earlier years, in order to achieve a successful outcome.

Session	Focus	General Content
1	Product Analysis & Design	Analysis of the design problem / understanding the context of their product / start to generate initial sketches.
2	Designing & Developing a Final Solution	Finish initial sketch ideas to satisfy the requirements of the problem / sketch final design in 3D form, both assembled and exploded.
3	CAD Design	Using QuickCAM 2D Design, draw the outlines of the two parts of your design. Save the design as front and back.
4	Create the Cutter Paths	Using the CAM Wizard, select the material and create the tool paths for machining both the front and back of the part.
5	Post Processing	Simulate and then post process the cutter paths to create the G&M Code CNC Program for both parts, ready for output to the Router.
6	Manufacture, Assembly & Finishing	Using VR Milling and the Denford CNC Router, machine out both halves of the part. Glue and assemble speaker dock, sand and wax to finish.
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Project Delivery Session Detail

Session	Focus	Session Content
1	Product Analysis & Designing	Start the session off with a discussion of how students can make the sound come out louder and clearer without the use of electronics. Demonstrate playing sound from a mobile phone, then putting the phone in an empty cup... what happens? Repeat with a rolled paper cone placed on the phone speaker... are there any differences? Ask students to read through the design problem, then - working individually - ask students to make a rough sketch of their device (or a neighbour's device). Ask them to measure and note critical dimensions such as the width and thickness of the device, as well as where the speaker is on the device – again, with dimensions. Now get students to look at examples of docks that have already been created and start to sketch up their own ideas. There is an area for each idea, with each having room for a front and back of their design. This is to allow understanding of how it will be made. There is space for students to create 4 initial ideas. They are not expected to finish these all by the end of this session.
2	Designing & Developing a Final Solution	Students will need to finish their sketched ideas, then decide on one design, or elements of some to take forward to their final idea. On the Design Realisation page, get students to sketch out their final idea in two ways: the first needs to be a complete assembled design and the second an exploded view. IMPORTANT: You can only machine the front face of each part, so students need to ensure that they create the cut-out on the front face of the back piece.

Session	Focus	Session Content
3	CAD Design	Using Quick CAM 2D, follow the CAD Support Booklet to draw the speaker dock ready for manufacture. Design both the front and rear halves of the speaker dock. Students can use the CAD Support Booklet to support them in self-guided learning. By the end of this session, it is expected the students will have their design finished.
4	Create the Cutter Paths	Using the CAD Support Booklet, Students will use QuickCAM 2D to set up machining programmes for the front and back part of the speaker dock. It will be necessary for students to select the material, set up the tool strategies, depths of cut and tools to be used.
5	Post Processing	Once the cutter paths are defined, they can be simulated and then both parts are post processed to produce the G&M Code CNC Program (.fnc file)
6 7 8	Manufacture, Assembly & Finishing	The next three sessions will be used to machine the parts on the Denford CNC Router. The Teacher/Technician will need to set up the Router with a sacrificial bed, as the tool will have to machine deeper than the billet thickness to cut the part out. Open the two programs in VR CNC Milling V5, and machine them. The tooling and work offsets for this project will need to be pre-set. This will be covered in training, but you can also check your Denford VR CNC Milling V5 Training Guide for guidance on how to do this. Once students have both halves of their dock machined, they will need to assemble the two halves together using PVA glue. Once glued, students can then sand with the glass paper (or use a power tool where available) and seal with wax.

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