

Learning objective: we are learning how to make 3D products from flat materials and design our own flat-pack Christmas decorations.

Success criteria:

- I can describe how a product can be made from flat materials.
- I can identify advantages and disadvantages of this type of manufacturing.
- I can design and make my own flat pack product as part of a creative group activity.

Online resources from WMG

Open the slideshow here:

<https://warwick.ac.uk/wmgoutreach/resources/flatpack/>

Resources you will need to provide

Rulers, Pencils, Scissors, Thick card, Decorative resources, e.g. tissue paper, small pompoms, sequins, glue for attaching decorations

Optional: protractors or set squares

| Time | Input/activity | Resources |
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| 20 minutes | <p>[Slide 2] Introduce the learning objective.</p> <p>[Slide 3] Show the video of the flat packed wooden Christmas tree in parts and being assembled.</p> <p>Discuss how it is designed for assembly. E.g. How are the pieces held together? What stops them from falling apart? How would you know where to put each piece? How is it designed to be stable? Why doesn't it fall over?</p> <p>Talk about the manufacturing techniques used to make it. Could you use a hand saw to cut the parts this accurately? No.</p> <p>[Slide 4-5] This is the laser cutter which made the Christmas tree. Explain that a laser cutter uses a beam of light that burns through wood, or melts plastic. (Imagine a torch that heats up while it is turned on. A laser is bit like a torch in which the light is concentrated into a very thin, very bright beam which gets extremely hot.) Play the video on slide 5 showing how the laser cutter works.</p> <p>What are the advantages and disadvantages of laser cutting? <i>Possible answers:</i> <i>Advantages:</i> A robot does the cutting for you. You can cut fine details and internal holes. It is fast. Using a robot (the laser cutter) means you can make lots of identical products, which would be very difficult to do by hand.</p> <p><i>Disadvantages:</i> lasers are dangerous, e.g. they can blind you, and so you have to use the machine very carefully. It produces smoke when it burns things. You can't use it with all materials, as some types of plastic produce toxic gases when they are heated up.</p> <p>[Slide 6] Discuss where the children might have seen flat packed products, and examples of flat packed products.</p> | <p>Slideshow</p> <p>Video of Wooden Christmas tree Assembly</p> |

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| | <p>[Slide 7] Ecobulk is an international project in which scientists, engineers and designers are working together to turn waste materials that would normally be thrown away into useful new materials. Why could this be good for the environment? <i>Possible answers: if they aren't reused, waste materials get thrown away and end up as landfill or being incinerated. This can release bad chemicals into the environment. Furthermore, new products are made out of new materials, which causes more waste. E.g. more trees being cut down for wood, or more pollution from making new materials. Some materials are not renewable – they will eventually run out.</i></p> <p>[Slides 8-10] Go through on board, noticing elements of the construction.</p> <p>[Slide 11] Discuss advantages and disadvantages of flat packing. <i>E.g. It saves space for transport and storage for the manufacturer & seller, which is cheaper and more environmentally friendly. Customers construct the products themselves. What could be the advantages and disadvantages of this? Parts can be used in different combinations, e.g. different table tops or seats could go with the same sets of legs. What are the advantages of this to the manufacturer and the consumer?</i></p> | | | | | | | | | |
| 20-30 minutes | <p>Building a 3D structure from flat components</p> <p>[Slide 12] Pass the paper templates out and ask each student to cut and assemble their item following the instructions. Some are more difficult than others so you may wish to choose those with the most dexterity for the complicated products. From simplest to most complicated they are:</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">1: Bauble</td> <td style="width: 50%;">2: Gingerbread people</td> </tr> <tr> <td>3: Star</td> <td>4: Sleigh</td> </tr> <tr> <td>5: Dog</td> <td>6: Deer</td> </tr> <tr> <td>7: Squirrel</td> <td>8: Hillman Imp (car)</td> </tr> </table> <p>Discuss: How are the items designed to get a 3D shape out of the flat sheets of paper? All of this is done without using tape or glue. Talk about cutting slots to allow different pieces to fit together, folding one piece to give it a shape, etc.</p> <p>[Slide 13] This slide shows the 'new for 2023' paper lantern' talk about nets that have tabs that will need to be glued to create a 3D shape, you could discuss boxes and packaging that use these, have some old boxes that they could carefully disassemble to see the flat net shape</p> | 1: Bauble | 2: Gingerbread people | 3: Star | 4: Sleigh | 5: Dog | 6: Deer | 7: Squirrel | 8: Hillman Imp (car) | Paper templates |
| 1: Bauble | 2: Gingerbread people | | | | | | | | | |
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| 15-20 minutes | <p>Introducing the task</p> <p>[Slides 14-15] Explain: Now that you have practised making 3D objects out of card, you are going to work in a group to design and make your own idea to create a winter scene, using the stand provided as a base. Have a look at examples by Roger La Borde for inspiration.</p> <p>[Slide 16] Watch the video about different paper construction techniques.</p> <p>Optional discussion [Slides 17-21] Thinking about how the products you looked at were constructed, how could you create a stable tree? What do you need to think about when cutting slots?</p> <ul style="list-style-type: none"> - <i>The use of right angles (how could you check this?)</i> - <i>The width of slots</i> - <i>Straight lines</i> - <i>Wide base</i> | | | | | | | | | |
| 40 minutes | <p>Design and making</p> <p>[Slide 22] Give the children time to discuss and sketch design ideas.</p> <p>Children make their figures with ruler, pencil, scissors, card, decorations. Optional: protractor, set square, or use the corner of something else to check for right angles.</p> <p>Children should test the stability of their product and whether it can be easily assembled and re-assembled. Do they need to number the slots to help someone else assemble it?</p> | <p>Stands</p> <p>Rulers, pencils, scissors, card</p> <p>Optional: protractor or set square, decorations</p> | | | | | | | | |

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| <p>10 minutes</p> | <p>Testing & Evaluation</p> <p>[Slide 23] If the products are dry, the children can swap them around to try assembling and disassembling each other's.</p> <p>Evaluate and discuss: What is good about your product? How could it be better?</p> <p>Share your photos with us: @wmgwarwick #WMGoutreach or email wmgoutreach@warwick.ac.uk</p> <p>Find our other resources and opportunities on www.warwick.ac.uk/wmgoutreach</p> | |
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