

***Design for Manufacture – Press Forming
Mobile Phone Holder
Presentation Notes***

No	2-4	<i>Introduction</i>	Notes
		<p>The Leaving Certificate Technology syllabus encourages students to investigate a variety of manufacturing techniques in order to produce artifacts as solutions to specific problems.</p> <p>Students need to be exposed to a variety of processes and materials in the classroom in order to enhance their problem solving and design capabilities.</p> <p>The unit introduces students to the process of Press Forming using ‘plug and yoke’ moulds, working with a number of materials including ‘Foamex’ – a rigid foam PVC sheet and encourages students to explore a range of techniques in the realization of real life design situations culmination in the development of individualized products.</p> <p>The unit can be presented using a thematic approach, which can encompass a range of topics in an integrated manner.</p> <p>Teachers are encouraged to adapt and develop the projects to meet their own individual circumstances in order to provide design opportunities for their students.</p>	

<i>No</i>	<i>5-6</i>	<i>Objectives</i>	Notes
		<ul style="list-style-type: none"> • The students will develop: • A range of manufacturing skills through a series of workshop processes: • Heat forming • The use of jigs and formers • Marking out, cutting, drilling, finishing and assembly of materials. • An understanding of the characteristics of a range of thermoplastics materials • Basic graphics and design skills and techniques • Research skills using ICT • Communication skills such as product analysis techniques and design specifications • The ability to design an artifact according to user requirements 	

<i>No</i>	<i>7</i>	<i>Presentation</i>	Notes
		<p>Theme:</p> <p>Mobile phones are a worldwide phenomenon that have revolutionised the way we communicate with one another. They are both desirable and essential to our everyday lives. The ways in which we carry, protect and secure our mobile phones can be based on fashion, practicality and function.</p>	

<p>Design Brief:</p> <p>Design and make a functional mobile phone holder suitable for personal or desktop use</p>	
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<i>No</i>	<i>8</i>	<i>Constraints</i>	Notes
		<ul style="list-style-type: none"> • Expectations will be constrained by the design, communication and manufacturing skills of the target group • Project should be manufactured using the heat forming process of Press forming (Vacuum Forming can be utilised to enhance the project) • Emphasis should be placed on functionality and ease of use of product • The completed product should be finished to a high standard and the use of graphics to enhance its appearance should be encouraged • Products can be individualized to suit particular models of phone. 	

<i>No</i>	<i>9</i>	<i>Research</i>	Notes
<ul style="list-style-type: none"> • Remember the majority of students need stimuli in order to come up with ideas • Present plenty of examples in order to provide opportunities for stimulation, investigation and research • Encourage personal research to show how existing solutions influenced students thought processes • Refer to accompanying Research presentation (Add to this according to the needs of the group) 			

<i>No</i>	<i>10</i>	<i>Resources</i>	Notes
<p>The resource list suggests a range of materials and equipment that can be used in the unit:</p> <p>Materials:</p> <ul style="list-style-type: none"> • 3mm expanded foam sheet (Foamex) • 1.5mm Vacuum forming plastic • 18mm MDF or suitable material for production of moulds and formers • Grip range press fit nylon click fasteners • Tie wraps • Acrylic cement or solvent <p>Equipment:</p> <ul style="list-style-type: none"> • Oven • Vacuum former • A range of hole saws or forstner bits 			

<ul style="list-style-type: none"> • Scroll saw • Wet and dry paper 	
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<i>No</i>	<i>11</i> <i>Making the Formers</i>	Notes
	<ul style="list-style-type: none"> • Two formers, a male and a female are required for both sides of the casing • These can be made from MDF (suggested size: 18mm). • Keep shapes simple and ensure that contour changes are gradual. • The female former needs to be larger than the male former by the thickness of the casing material. This will avoid distortion to the shape of the casing. • The male former needs to be fixed to a flat wooden base. To ensure alignment of formers, dowel guides, former clamps or pen marks can be used. • Tapered sides are not necessary, but a small radius along the top edge of the male former will ease removal. 	

<i>No</i>	<i>12</i> <i>Heating and Forming</i>	Notes
	<ul style="list-style-type: none"> • The material is placed in a pre heated oven and heated for the appropriate time (Approx. 30 secs. at 140°C for 3mm Foamex). • Heated material is then draped over the male former. • The female former is then located over the male former. Force is applied to sandwich the two together. • Both formers are held in place until the material cools. This can be done by hand or by using a simple clamp. • Release the plastic from the male former and repeat the process for the second side of the casing if necessary. 	

<i>No</i>	<i>13</i> <i>Cutting and Assembly</i>	Notes
	<ul style="list-style-type: none"> • Using a pencil, mark a line around the outside of the casing approximately 10mm from the case edge in order to create a lip. • Trim the edge using a coping saw or a scroll saw. • Alternatively, the casing can be trimmed using a Gerbil cutter and filed to shape. • Use wet and dry paper to finish edges. 	

<i>No</i>	<i>14</i> <i>Support Bracket</i>	Notes
	<ul style="list-style-type: none"> • The formed material for the casing can be now be cut in half using a scroll saw or a conventional hacksaw. It is then draw filed to finish. • The support bracket can be made from a similar size piece of foamex of different colour. 	

<ul style="list-style-type: none"> • The profile of the casing can be marked out using the casing as a template. • The profile itself is cut approximately 5mm smaller than the casing and then filed to finish. 	
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<i>No</i>	<i>15</i>	<i>Assembly</i>	Notes
		<ul style="list-style-type: none"> • Both the material for the casing and the support can be positioned and supported using masking tape in preparation for gluing. • Both materials are then affixed using tensol solvent, tensol cement or a glue gun. • Make sure the assembly is not disturbed during the curing process. 	

<i>No</i>	<i>16</i>	<i>Bending</i>	Notes
		<ul style="list-style-type: none"> • Using a strip heater, bend the support bracket to an appropriate angle. • The material will become plastic a lot quicker than similarly dimensioned HIPS. 	

No	17	<i>Finished Project</i>	Notes
		<ul style="list-style-type: none"> Students should be encouraged to investigate a variety of assembly methods and finishing techniques in order to enhance the overall appearance and to individualize the finished project. 	

No	18	<i>Design Variations</i>	Notes
		<ul style="list-style-type: none"> Using the 'Plug and Yoke' method of Press Forming, a variety of solutions can be achieved. Joints can be glued or joined with plastic fixings. 	

No	19	<i>Extension Concepts</i>	Notes
		<ul style="list-style-type: none"> Included is a list of suggested projects that can be incorporated into the classroom and which can be used to extend students use of the Press Forming technique. 	

<i>No</i>	<i>20</i>	<i>Times and Temperatures</i>	Notes
		<ul style="list-style-type: none">• Shown are the suggested heating times and oven temperatures for a number of Press Forming materials.• If plastic becomes misshapen during the forming process, it can be returned to the oven and reheated until it returns to its original shape.• Minor scratches on the surface can be removed using a hair dryer.	