

Meden School Curriculum Planning							
<b>Subject</b>	CNAT Engineering Design	<b>Year Group</b>	Y11	<b>Sequence No.</b>	2	<b>Topic</b>	RO40 Design, Evaluation and Modelling, (with elements of RO38)

Retrieval	Core Knowledge	Student Thinking
What do teachers need <b>retrieve</b> from students before they start teaching <b>new content</b> ?	What <b>specific ambitious knowledge</b> do teachers need teach students in this sequence of learning?	What real life examples can be applied to this sequence of learning to <b>development of our students thinking, encouraging them to see the inequalities around them</b> and 'do something about them!'
<p>The following knowledge and understanding should be retrieved:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Students will be familiar with 'analysing products' in their day to day life whenever they make a choice about which of a product to buy.</li> <li><input type="checkbox"/> Students will have encountered design briefs at KS3 and so this knowledge should be retrieved at this point.</li> </ul> <p><input type="checkbox"/> The preparatory learning (above) is essential to this assignment work and so should be regularly retrieved</p>	<p>The following ambitious knowledge needs to be taught:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Know that designers need an understanding of how products are manufactured to ensure that their ideas can be produced effectively.</li> <li><input type="checkbox"/> Know that analysing how products are made can help to inform designs, and it can be useful to disassemble existing products to discover how they function and how they were manufactured.</li> </ul> <p><u>Teaching for Task 1</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Know how to carry out an analysis of a design brief</li> <li><input type="checkbox"/> Know methods of researching the product requirements including <ul style="list-style-type: none"> <li>- the types of information obtained from primary research,</li> <li>- the types of information obtained from secondary research,</li> <li>- how market research is used to learn from existing products,</li> <li>- how interviews with potential users and focus groups can be valuable,</li> <li>- how to use of tables of anthropometric data.</li> </ul> </li> <li><input type="checkbox"/> Know how to analyse existing products using: <ul style="list-style-type: none"> <li>- ACCESS FM (Aesthetics, Cost, Customer, Environment, Size, Safety, Function, Materials and Manufacturing)</li> </ul> </li> </ul> <p><b><u>Assessed NEA Element – Set Assignment Task 1</u></b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Know the nature of the product the examiner is requiring you to analyse, (e.g. LED lamp).</li> <li><input type="checkbox"/> Know the content of the Design Specification for the product.</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Discuss how having effective product analysis skills can support wider life. All students will be life long consumers. As we consume products we impact the environment, the working lives of others etc. Discuss how we can analyse products to make good decisions in these regards.</li> </ul>

<p><input type="checkbox"/> Learning from lessons using excel in ICT should be retrieved here.</p> <p><input type="checkbox"/> Knowledge from maths of both bar charts and pie charts should be referenced and retrieved here.</p> <p><input type="checkbox"/> Depending on the product being disassembled a range of tools and processes from KS3 DT lessons will apply here and should be retrieved as appropriate.</p> <p><input type="checkbox"/> Experiences of following instructions to assemble a product, (e.g. Vex in Y8 enrichment, at home building Ikea type furniture) will apply here and should be referenced.</p> <p><input type="checkbox"/> The preparatory learning (above) is essential to this to this element of the assignment work and so should be regularly retrieved</p>	<p><input type="checkbox"/> Know how to analyse each of the example products using ACCESSFM</p> <p><input type="checkbox"/> Know how to gather the opinions of others in order to have a wider range of opinions.</p> <p><input type="checkbox"/> Know how to enter that results of the survey/questionnaire into Microsoft Excel and to then use excel to create a graphical representation of the results, (using bar or pie charts).</p> <p><input type="checkbox"/> Know how to use a ranking matrix to compare the products.</p> <p><input type="checkbox"/> Know how to use all the findings from the above to summarise the qualities, strengths and weaknesses of each of the products.</p> <p><u>Teaching for Task 2</u></p> <p><input type="checkbox"/> Know how to analyse existing products using product disassembly.</p> <p><input type="checkbox"/> Know how to select, and safely use the tools required for disassembly.</p> <p><input type="checkbox"/> Know how to use of manufacturers manuals or other published sources to support the disassembly of products.</p> <p><input type="checkbox"/> Know strategies or sources of information for finding key information about the disassembled product and its parts including:</p> <ul style="list-style-type: none"> <li>- Its components and their functions,</li> <li>- Its assembly methods</li> <li>- Its materials, (e.g. the use of plastics recycling codes)</li> <li>- Its production methods, (e.g. how to identify that a part has been injection moulded)</li> <li>- Any maintenance considerations</li> </ul> <p><b><u>Assessed NEA Element – Set Assignment Task 2</u></b></p> <p><input type="checkbox"/> Know what tools will be required for the specific product they are disassembling and how/why each one is used.</p> <p><input type="checkbox"/> Know the potential hazards that will be encountered during the disassembly process.</p> <p><input type="checkbox"/> Know how to assess and rank the risk presented by these hazards using a severity/likelihood matrix.</p> <p><input type="checkbox"/> Know control measures that will mitigate the hazards/risks identified.</p> <p><input type="checkbox"/> Know who is responsible for implementing these control measures.</p> <p><input type="checkbox"/> Know how to present the disassembled product.</p> <p><input type="checkbox"/> Know for each part of the disassembled product:</p> <ul style="list-style-type: none"> <li>- Its name</li> </ul>	<p><input type="checkbox"/> Discuss how easily/more difficult it was to disassemble the product. Discuss how a product being designed for disassembly can improve its sustainability as it enables both ‘in life maintenance’ and ‘end of life recycling’.</p>
--	---	--

<p><input type="checkbox"/> Learning from both KS3 Train project, and RO39, and the production of orthographic drawings will support the understanding of the examiners drawing and so should be referenced here.</p> <p><input type="checkbox"/> Learning from both KS3 tinkercad project, and RO39, and the production of CAD models will support the production of these models and so should be referenced here.</p> <p><input type="checkbox"/> The preparatory learning (above) is essential to this to this element of the assignment work and so should be regularly retrieved</p> <p><input type="checkbox"/> Knowledge of materials, processes etc from KS3 will contribute to this activity. The specific types of materials and processes that should be retrieved will depend on the nature of the task given by the board.</p> <p><input type="checkbox"/> Knowledge of safety precautions etc from work at KS3 should be retrieved here.</p>	<ul style="list-style-type: none"> <li>- <i>Its function in the overall product</i></li> <li>- <i>The material used to make it, and why this material was chosen.</i></li> <li>- <i>The manufacturing method used to make it.</i></li> <li>- <i>The method used to add this part to the assembly.</i></li> </ul> <p><input type="checkbox"/> <i>Be able to suggest reasoned/justified improvements for the design/details of some of the parts of the product.</i></p> <p><u>Teaching for Task 3</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Know how to 'read' and understand the engineering drawing supplied by the examiner.</li> <li><input type="checkbox"/> Know how to draw each of the parts of the product given by the examiner using CAD.</li> <li><input type="checkbox"/> Know either how to draw, or how to import into the CAD work from a pre-drawn catalogue each of the components within the product given by the examiner.</li> <li><input type="checkbox"/> Know how to use the CAD to assemble the separate parts and components into a complete product.</li> <li><input type="checkbox"/> Know how to use the CAD software to simulate the operation of the product.</li> </ul> <p><b><u>Assessed NEA Element - Set Assignment Task 3</u></b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <i>Know how use the required tools in the chosen CAD software.</i></li> <li><input type="checkbox"/> <i>Know how to find and import components into the drawing.</i></li> <li><input type="checkbox"/> <i>Know how to use the software to 'mate' parts.</i></li> <li><input type="checkbox"/> <i>Know how to use the software to simulate the products operation.</i></li> </ul> <p><u>Teaching for Task 4</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Know how to select an appropriate modelling method for the product type that has been given. These could include, sheet, block, breadboarding, 3D printing etc.</li> <li><input type="checkbox"/> Know how to select and use appropriate materials, processes, tools and equipment to produce a prototype.</li> <li><input type="checkbox"/> Know the potential health and safety hazards associated with each stage of the prototypes production.</li> <li><input type="checkbox"/> Know how to check for and ensure quality at each stage of the prototypes production.</li> </ul>	<p><input type="checkbox"/> The decisions made regarding materials in particular will impact the prototypes sustainability. Discuss the pros/cons of each option and how these issues may impact the material choices.</p> <p><input type="checkbox"/> Prototyping could be seen as wasteful of materials. How could it also be seen as a positive that reduces waste in the future?</p>
---	--	--

<p><input type="checkbox"/> Learning from the risk assessment activity from task 2 should be retrieved here as similar principles apply.</p> <p><input type="checkbox"/> The preparatory learning (above) is essential to this to this element of the assignment work and so should be regularly retrieved.</p> <p><input type="checkbox"/> The preparatory learning (above – particularly in task 4) is essential to this element of the assignment work and so should be regularly retrieved</p> <p><input type="checkbox"/> Evaluation activities from KS3 will apply here and should be retrieved and referred to.</p> <p><input type="checkbox"/> Methods for presenting design ideas from Task 1 of the RO39 assignment will</p>	<p><input type="checkbox"/> Know what a Gantt Chart is and how it is used.</p> <p><b><u>Assessed NEA Element – Set Assignment Task 4</u></b></p> <p><input type="checkbox"/> Know how to make the prototype including:</p> <ul style="list-style-type: none"> <li>- The processes involved at each stage and a correct sequence for these processes.</li> <li>- The tools, equipment and materials needed at each stage of production.</li> <li>- The healthy &amp; safety issues at each stage of production.</li> <li>- How to ensure/check for quality at each stage of production.</li> </ul> <p><input type="checkbox"/> Know how to use a Gantt chart format to plan the timings for each stage of production.</p> <p><input type="checkbox"/> Know the potential hazards that will be encountered during production.</p> <p><input type="checkbox"/> Know how to assess and rank the risk presented by these hazards using a severity/likelihood matrix.</p> <p><input type="checkbox"/> Know control measures that will mitigate the hazards/risks identified.</p> <p><input type="checkbox"/> Know who is responsible for implementing these control measures.</p> <p><u>Teaching for Task 5</u></p> <p><input type="checkbox"/> Know how to follow the production plan from the previous task in order to manufacture the prototype.</p> <p><input type="checkbox"/> Know how to record/document the production of the prototype.</p> <p><b><u>Assessed NEA Element – Set Assignment Task 5</u></b></p> <p><input type="checkbox"/> Know how to select and use appropriate materials, processes, tools and equipment to produce a prototype, (as set out in the production plan).</p> <p><input type="checkbox"/> Know how to apply the safe working procedures set out in the risk assessment when making the prototype</p> <p><input type="checkbox"/> Know how to record the key stages of making the prototype</p> <p><u>Teaching for Task 6</u></p> <p><input type="checkbox"/> Know what it means to analyse a product against its design specification.</p> <p><input type="checkbox"/> Know how to present ideas for potential improvements in a products design.</p>	<p><input type="checkbox"/> Discuss the responsibilities workers have toward one another when working in a manufacturing environment. Discuss how the ‘Heath &amp; Safety at Work Act 1974’.</p>
--	---	--

<p>apply here and so should be referenced and retrieved to support this activity.</p> <p><input type="checkbox"/> The preparatory learning is essential to this element of the assignment work and so should be regularly retrieved</p>	<p><b><u>Assessed NEA Element – Set Assignment Task 6</u></b></p> <p><input type="checkbox"/> Know how to compare and evaluate the prototype design against the specification.</p> <p><input type="checkbox"/> Know how/where to incorporate the thoughts and opinions of others into this evaluation.</p> <p><input type="checkbox"/> Know how to suggest improvements to the products design using photos, sketches and notes, (particularly aiming to address any areas of the specification where the prototype is judged to have fallen short/failed).</p>	
---	---	--

<b>Tier 2 Vocabulary</b>	<b>Tier 3 Vocabulary</b>
<p>Analyse Aesthetics Sustainability Maintenance Severity Likelihood Mitigate Components Evaluate</p>	<p>Design Brief Disassemble Primary Research Secondary Research Anthropometrics Specification Ranking matrix Injection moulding Orthographic CAD Mate (in terms of being a CAD function) Prototype Gantt Chart</p>