KS4 Hospitality & Catering

Y11 Unit 1 Term 1

SUBJECT: Engineering

UNIT: Year 11 Term 1

SANDHILL VIEW EST. 1953

ENGINEERING DESIGN

LEARNING OUTCOME 2: Understand the requirements of design specifications for the development of a new product

TOP TIP

DFMA and D4D closely link to the use of **STANDARD COMPONENTS** that help make a product easier to take apart and also put together. When questions come up about DFMA and D4D then you should always reference standard components and provide an example.

MAINTENANCE

The process of keeping something in good condition.

Maintenance of a product refers to what needs to be done to keep the product in working order:

- Changing batteries
- Cleaning
- Replacing components
- Repairing the product if broken

TOP TIP

DESIGN BRIEFS & SPECIFICATIONS – remember that in every Y7 and Y8 product you were given a **BRIEF** to work to and from this brief you created your own **SPECIFICATION** or success criteria for your individual design project whether it was an item of copper jewellery or a mood light.

PRODUCT DESIGN ANALYSIS means studying how well a product does its job. This involves answering the following questions:

- What is the **function / purpose** of the product?
- What are the **different parts** of the product and how do they work together?
- How does the product use **shape**, **form**, **colour**, **texture** and **decoration**?
- What **materials** and **components** are used to make the product?
- Which **processes** were used to make the product?
- **Who** would **buy** this product?
- How well does the product **do its job** compared with other similar products?
- What is **unique** about the product?

DESIGN FOR MANUFACTURING ASSEMBLY - DFMA

DESIGN FOR MANUFACTURE AND ASSEMBLY (DFMA) is a design approach that focuses on ease of manufacture and efficiency of assembly. By simplifying the design of a product it is possible to manufacture and assemble it more efficiently, in the minimum time and at a lower cost.

Traditionally, **DfMA** has been applied to sectors such as the design of automotive and consumer products, both of which need to efficiently produce high quality products in large numbers. More recently, construction contractors have begun to adopt **DfMA** for the off-site prefabrication of construction components such as concrete floor slabs, structural columns and beams, and so on.

DESIGN FOR DISASSEMBLY (DfD) is the process of designing products so that they can:

EASILY, COST EFFECTIVELY and RAPIDLY be taken apart at the end of the products life (either no longer used or broken) and can be reused or recycled. Products that have been designed for disassembly are easier to MAINTAIN, REPAIR and RECOVER COMPONENTS AND MATEIRALS for REUSE or RECYCLING purposes. D4D products are better for the ENVIRONMENT and can be said to be SUSTAINABLE DESIGNS.

Manufacturers design and manufacture products that are easy to disassemble for a number of reasons other than environmental impact, such as:

- Reduction in production costs
- Greater technical efficiency
- More flexibility during product development
- Reducing the scale of resources required.

DESIGN FOR DISASSEMBLY – D4D

REQUIREMENTS OF A DESIGN SPECIFICATION

The specification draws on the information collected and presented during the research section. The specification is a number of straightforward statements, made clearly outlining the nature of the project to be designed and manufactured. If the research section has not been completed fully, the specification will also be lacking.

1. The specification should be composed of simple, clear statements. Keep the statements as short as possible.
2. If possible, always refer to the research you have carried out. For example, "The colour scheme will be based on blue and red as these colours are the most popular - as seen in my questionnaire".
3. Look at each page of your research and try to write a statement based on each one. Most of the statements in the specification should refer to your research section.
4. Keep the number of statements to between 7 to 8 in total. Specifications should be short and precise in what they state.
5. Each of the statements should help determine the final design of the product. For example, there may be a statement concerning the overall size or weight of the product. This clearly places limits on the design of the product.
6. Ask another pupil or a teacher to read your draft specification. It should be easy for them to form a view of your final product, and describe it back to you. If this description is similar to what you intend for your final product, then your specification is correctly written.
7. Look at the specification written by another pupil attempting the same project. This will help you formulate further statements for your project.
8. The specification should take you no longer than an hour to write, if you have carried out a detailed research.

AESTHETICS	The **AESTHETICS** of a product is the look and style of a product. Here you may look at the colours used, the shape of the product and the style of product that you are going to manufacture.	BENEFITS	What are the **BENEFITS** of buying and using your designed product over other products on the market. What does you product offer that others do not – this could be a key feature or a new aesthetic for example.
ERGONOMICS	**The study of people and their relationship with the environment around them.** When anthropometric data (see below) is applied to a product, e.g. measurements of the hand are used to design the shape and size of a handle, this is **ERGONOMICS**.	FEATURES	What are going to be the main **FEATURES** of your product – these could be the main selling points of your product, what sets it apart from other similar products on the market. These could be called your USP – Unique Selling Points.
ANTHROPOMETRICS	**The study of the human body and its movement,** often involving research into measurements relating to people. It also involves collecting statistics or measurements relevant to the human body, called **ANTHROPOMETRIC DATA**.	PRODUCT SAFETY	When you design a project, it is essential that it is **safe** for people to use. You should always refer to safety when creating a specification of a new product. **Safety** can cover, sharp edges, use of finishes like varnishes, having no loose small components etc.

TOLERANCE

When a product is **mass produced** in thousands and hundreds of thousands, samples are regularly checked to ensure that they fall within the **tolerance** allowed. This ensures:

- The quality and consistency of the product.
- Each copy of the product is the same and works exactly the same way.
- Products that have many parts, will fit together and work in the way that they are supposed to – **DESIGN FOR MANUFACTURING ASSEMBLY**
- Products that do not fit the set tolerances, are rejected and **RECYCLED**.

Checking that a product is manufactured within an upper and lower limit.

EXAMPLE: Thousands of steel bolts are manufactured by a company. Samples are check that they are the correct size. Each bolt must fall within a maximum and minimum length.

The tolerance of the bolt is said to be: 80.5mm +0.5mm -0.5mm

Therefore in the above example if:

The BOLT tested measured **80.3mm** – would be **accepted** as it sits **within the tolerance set.**

The BOLT tested measured **81.2mm** – the bolt would be **rejected** as it is **out of the set tolerance**.