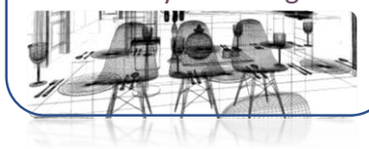
UNIT 7: MAKING PRINCIPLES

SELECTION OF MATERIALS A AND COMPONENTS

Prototypes
A prototype is a first or preliminary version of a product. There are several categories of prototype: It could be a working, visual or functional prototype

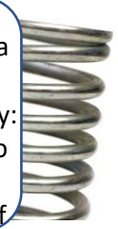
Wire frame
Visualise your product in a variety of settings



Rendering
A virtual version may be created by using hand drawing techniques or a CAD render to: Visualise a product Test different colours, textures and finishes Gather customer feedback

Functionality
Investigate the functionality of a material to ensure it is appropriate for your prototype. Consider: Strength, Movement Conductivity (electrical & thermal)

Standard Components
A component is a part used in a product that is often prefabricated. Components may: Require specialist machinery to make. Be expensive and time consuming to produce yourself



Project Management triangle
Balancing the cost of your design and managing a deadline will require compromise, as you can only achieve two attributes of the triangle

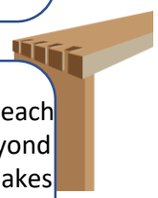
TOLERANCES

What is tolerance?
Tolerance is an acceptable margin of error for manufactured parts, publications, garments or electronic components

Applying tolerance
This can be applied to measurements, weight, voltage, resistance or properties e.g. elasticity. Tolerances are often given as (±) e.g. ±1mm

Cost of precision
In industry, the narrower the degree of tolerance, the more the item is likely cost to produce. High tolerance and High Performance = High Cost

Material Allowances
When using different materials, allowances may be used to make it easier for the task to be completed accurately eg. A wooden joint may have a deliberate overlap



Joint overlap
A joint is often created with each plank protruding slightly beyond the edge of the joint. This makes allowances for planning and sanding to make the joint perfectly smooth.

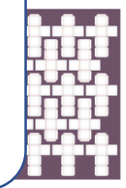
Quality Assurance (QA)
Quality assurance is the desired level of quality the product must reach to be acceptable. The QA document will set this out in a specification to the manufacturer.

Quality Control (QC)
Quality control is a system of checks of the manufactured or printed product. Testing against given specifications (QA) to assure quality, accuracy and fitness for purpose.

MATERIAL MANAGEMENT

Material Management
Material management is an approach to planning and controlling material wastage within the manufacturing process. Planning ahead is key to reducing waste

Tessellation
Nesting shapes is a process that limits the amount of waste material by closely grouping them together

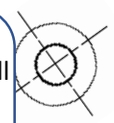


Pattern and grain matching
A set of kitchen cabinet door fronts is marked out on a single sheet of natural wood
All In the same direction ensuring the pattern matches across all doors

Stock forms
Stock forms are convenient since they are known quantities and sizes that are commonly available. This allows a designer or manufacturer to plan cutting layouts and order materials

Manufacturing plan
A manufacturing plan helps to identify the correct tools for each process involved in production. This also helps to ensure quality control will take place.

Datum points
A datum is a point from which all measurements are taken. A datum symbol may be used to show the square face side and face edge of a piece of timber



Production tools
Repetitive accuracy can be ensured by using jigs or formers when manufacturing parts or products. A jig can be used to ensure certain parts fit together when producing batches.

TOOLS, EQUIPMENT, TECHNIQUES AND FINISHES

Tools, Techniques, Processes
A **tool** is a device or implement used to carry out a particular function, for example, scissors

A **technique** is a way of carrying out a particular task, for example sewing

A **process** is a series of steps to work towards the completion of a final product, for example to overlock a seam

PPE
Personal Protective Equipment includes anything that will protect users of equipment and products against health and safety risks eg. Goggles, Dust Mask, Apron, Gloves etc

Health and safety executive
In industry, there is strict H&S legislation provided by HSE and government to ensure people are as safe as possible: Data sheets and manuals, Age restrictions Specialist training

Signage
Triangular signs: potential harm
Red circular signs: prohibited actions or access
Blue signs: safety instructions
Green signs: indicate safety

Data Sheets
A data sheet is often provided by a material or equipment manufacturer highlighting any potential hazards with use

Risk Assessment
Are performed to highlight dangers and limit the risk of accidents occurring. Schools complete risk assessments to ensure students are safe when using equipment or on trips

SURFACE TREATMENTS AND FINISHES

Treatments and Finishes
Surface treatments and finishes are applied to materials for two main reasons:
Functionality – (Protection)
Aesthetics – (Appearance)

Material Protection
Attack from nature and the elements commonly includes weather protection: Oxidisation and corrosion, Rot, Mold, UV degradation, Insect, creature and biological attack

Volatile Organic Compounds (VOC)
Many finishes may contain high VOCs, it is important that the correct PPE is worn to prevent hazards to health

Improving Functionality
The benefits of treatments and finishes may improve functionality, as well to maintain it

Aesthetic Qualities
Finishes can be applied for purely aesthetic reasons: Printing, dyeing, staining Embellishment, Applying a sheen or texture

Application Methods
A finish is likely to be applied to a product. The main methods of application include: Spraying / painting / rolling/ Dipping / Immersion Buffing /polishing/ Printing/ Adhesives

Application of Finishes
When applying finishes, consider the following: The work area is clear. The correct PPE is available. The finishing product can be stored safely