



Year 8 Design & Technology Pathway

Knowledge Booklet

This is your copy to KEEP for the entire school year

Name:

Class:



Design and Technology Pathway:

This will consist of both Resistant Materials and Catering

Resistant Materials:

- **`The `Trox'** (personalised storage)
- Electronics'
- `Textiles'

You will be taught these topics, because...

'Students are able to build on the activities undertaken in the workshop in Year 7 by using a range of tools and processes to realise a directed/ personalised outcome. Students will be able to learn about meeting the needs of a client, designing and planning using data, iterative modelling and realisation skills'.

Catering

Year 8 - "A continuation of practical skills, nutrition and evaluation"

You will be taught these topics, because...

'Students are able to build on previous knowledge (Year 7) undertaken in the kitchen environment by using a range of kitchen appliances to prepare cook and serve food to produce healthy, personalised and individual products. Students will be able to learn how to meet the needs of a potential client (brief) and how to evaluate their product'.

What will you learn on the Design and Technology Pathway?

You will learn about tools and processes in the workshop/catering room, joining, drawing conventions, healthy eating, health and safety. The work of others- designers and movements, famous chefs

Why?

To give you an opportunity to gain an understanding of 'real life' practical skills. You will be learning through a broad range of practical activities and theoretical elements to enable you to become confident in your D&T lessons

Health and Safety is an important part of the D&T environment, so you must understand safety rules and expectations.

Throughout your time in D&T, you will be encouraged to improve your design skills through practice and demonstration, be creative and have high expectations of yourself

The Subjects

At KS3, students will study both an "Art and Design" pathway and a "Design and Technology" pathway for 1hr per area per week.

Assessment

As all subjects within the Art, Design and Technology faculty are predominantly practical, assessment and verbal feedback is an essential aspect of most lessons- this may be teacher led, peer or self-assessment.

At the end of each module, each student will be given grades based upon the work they have completed in addition to an Attitude to Learning and a Homework grade.

Wider Understanding

Each subject has a Scheme of Work geared towards teaching essential skills, knowledge and understanding with progression towards the KS4 GCSE courses in mind. Please find some resources listed below for wider reading in each subject area:

Art

How to Draw: 53 Step-by-Step Drawing Projects (Beginner Drawing Books) – Alison Calder www.tate.org.uk/visit/tate-britain www.pinterest.co.uk www.saatchigallery.com www.youtube.com

Catering

Hospitality and Catering - Anita Tull and Alison Palmer Exploring Food and Nutrition KS3 - Yvonne Mackey Essential Equipment for the Kitchen - Peter Fiell www.eatwell.gov.uk www.thinkfast.co.uk www.health4schools.net www.bbc.co.uk/schools/gcsebitesize/hospitality

Textiles

Three-Dimensional Embroidery - Janet Edmonds Digital Textile Design - Melanie Bowles www.technologystudent.com/ www.design-technology.info/home.htm www.viviennewestwood.com/en/ www.designmuseum.org/

Graphics

www.ilovetypography.com www.canva.com/ www.kidsthinkdesign.org/graphics/index.html www.bbc.co.uk/schools/ gcsebitesize/art

Resistant Materials

'How Things Work' - Conrad Mason
 'The Design of Everyday Things' - Don Norman
 'Starting Product design Exerciser: Questions and Answers' - Artiom Dashinsky

During Year 8 Design and Technology pathway you will....

Progress your skills by: Understanding the concept of Sustainability (materials) - Present design ideas – Be able to explain what is meant by Function Vs Aesthetics – Use advanced measuring/marking – Show quality design presentation - Produce models and test pieces (iteration) – Show developmental decision making – Understand different production techniques - Manufacture with precision – Use a range of surface finishes - Test & Evaluate – Consider Scales of Production

| Develop Literacy skills: | Dev | elop Numeracy skills: | Dev | velop Scientific skills: |
|--|-----|---|-----|---|
| Literacy: | • | Calculations of sizes | • | Use of scientific principles when |
| There are a range of extended writing oppor- tunities for each of the projects -both within and outside of the classroom | • | Scaling drawings | • | developing a brief or specification Measurement of materials and se- |
| Oracy: | • | materials required | | lection of components |
| Students will answer questions in full sentenc- es during discussion work and encouraged to | • | Graphic presentation of ideas to others | • | Classification of materials and their properties |
| read out loud where appropriate | • | Use of metric systems | • | Protecting materials from |
| Keywords: | | | | Conosion |
| Construct, Annotate, Specification, Promote, Blending, Shaping, Finishing, Design Client, | • | Analysis of client survey responses | • | Selection of appropriate materials |
| Justify, Modify, Analyse, Specification, Adapt, Input, Process, Output, Weaving, Applique, Embroidery | • | Measurement and marking out | • | Knowledge of material properties to be applied when designing and making- to include textiles |
| | | | • | The use of electronics |
| | | | • | Sustainability |
| | | | | |

Final Endpoints- by the end of the project, you should be able to:

Confidently use a range of independently collected data and manipulate a range of materials, components, tools and processes to design, develop (via iterative modelling), realise and further develop a range of products for identified target client/ groups



Personal Machine Training Record

As part of your Design and Technology course, you will be expected to use a range of equipment to help make your work to the highest standard. You will be taught how to use the equipment either individually, or as part of a group and as this happens you will be asked to tick and date the chart, below, to show that you are trained and confident. **Under no circumstances should you use equipment that you have not been trained to use!**

Make sure that you have made yourself aware of the safety signage and information located within your practical area.

| Equipment Name | Date | Trained (tick) |
|---------------------|------|----------------|
| Tenon saw | | |
| Chisel | | |
| Hegner (scroll) Saw | | |
| Sander/ Linisher | | |
| Pillar Drill | | |
| Flame Torch | | |
| Ceramic Chip Hearth | | |
| Strip Heater | | |
| Centre Lathe | | |
| Kitchen knives | | |
| Ovens | | |
| Hobs | | |
| Kitchen utensils | | |

If you require further instruction on the machinery during your lessons, ask!

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| Bench Vice A holding device. Final outcome- next ste | Bench Vice A holding device. Final outcome- next str Revealed, how could you produce your own design | Rench Vice A holding device. Final outcome- next ste Reserve Once the basic handle has been made and developed, how could you produce your own design different materials, sizes, shape | Try Square | Used for the accurate marking out of right angled and parallel lines |
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| different materials, sizes, shape | 5 | | | |

Design and Technology Pathway

k

Year 8 Catering

Objectives: To learn the basics of healthy eating, to understand what Michelin stars are and to investigate the work of famous chefs

| HEALTH & SAFETY | Wash hards before you | bedin | I mm har shoud be tled | bed | Aprons must be worn | Behave sensibly at all | Li'nes | Listen to instructions | | Rubbing in method | | K K | | | | Creaming Method | | | | | | Grating & krife hotes | | | | いいのであり | | | |
|-----------------|--------------------------|------------------|-------------------------|-------------------------------|--------------------------|--------------------------|--------------------------|------------------------|----------------------|-------------------|------------|----------------------|----------|------------|------------------|------------------|--------------|-------------|--------------------|------------|--------------|-----------------------|-------------|---------|----------------|--------------|----------------|-------------|----------|
| ary | What does it smell like? | How does t feel? | What does it look like? | What is the cost with profit? | What does it taste like? | luc Is the dish healthy? | e Is the dish as per the | specification? | | Cheese straws | | Philos Philosophiles | 5 | | | Upside-down cake | Cito | 92.49 | ていたので | | | Tuna bake | Sall | 5 | クトンドでき | | | | |
| Kéy Vocabu | Aroma | Texture | Appearance | Cost | Taste | AS A A | B Hol | 2 | | | 1/1/1 | | US V () | 11.0 | こうしょう | ートー | | | PRILLIANT LEARNING | TH ACHEKRY | No. | | | | | 2 | | 5 | 194 (M) |
| | Man | 5 | Cheese | | Straws | | | Butter | k Pudding | Pork Caker | NOUN CANES | | ENIFE? | - JAN - WA | 3.00 | WILLINS? | | Proc. Proc. | tr | E was | (2) while | for ind | OI I Indian | | | 25 | | | |
| Key Skills | Kubbing in method | Critering | Calle holds | -ayering food | Using an oven | Grati-g | Frying | | Evaluation word bank | Delicitie | | Yummy | Tempting | | Proutin watering | Disgusting | - Annetizina | | Tasteless | | IN READINESS | UCAP (AND BE) | H . CARNE H | mill to | NUTRITION, HOA | OCCENTATION, | GALTHY LIVING, | TIMINES AND | OT MORE! |

Year 8

Design and Technology Pathway

Homework in Design and Technology

You will be set homework tasks in each subject area/pathway equivalent to two tasks per term. For each homework task, a traffic light system is used to indicate the level of difficulty as follows:

-An outstanding piece of homework that is carefully completed with elements of personalisation. Presentation is exemplary

-A well-presented piece of work which meets all of the requirements of the task

-A basic piece of work that meets some of the requirements of the task. Some attempt has been made to present this well

| Catering | | | | | |
|--|----------|--|--|--|--|
| Homework 1 | Due Date | | | | |
| Read the text below in readiness for a test on this subject | w/c | | | | |
| Healthy Eating | | | | | |
| Healthy eating is needed to give good health, a failure to do so can lead to diabetes, high cholesterol, obesity and heart attacks. A balanced diet will provide the right amount of nutrients that a body needs. | | | | | |
| A balanced diet is based on the Eatwell guide, which is divided into 5 groups. Fruit and vegetables- needed for dietary fibre Carbohydrates- needed for slow releasing energy Proteins- for growth and repair Dairy- for calcium, strong teeth and bones Fats- for warmth and protection of organs You should try and eat from all of these groups every day. No food is banned but areas such as fat should try to be eaten in moderation. You should eat breakfast everyday as this gets your body ready for the day ahead, it helps you stay alert and gives you energy. | | | | | |
| You need to have between 6-8 glasses of water per day to keep you hydrated. A lack of water can lead to dehydration, which then gives you a headache, makes you confused, and heart rate and blood pressure increase. Water will control your body temperature and keep it at 37' C, keeps your skin moist and healthy and helps to remove waste from the body as well as keeping your joints lubricated. | | | | | |
| Homework 2 | Due Date | | | | |
| Read the text below in readiness for a test on this subject | w/c | | | | |
| George Auguste Escoffier | | | | | |
| George Auguste Escoffier was a French chef and author. He was born on 28th October 1846 in France, and died on 12th February 1935 at the age of 88. He was famously known as being the foremost leader of having a well organised, hygienic kitchen, that was disciplined and where the staff worked in silence. | | | | | |
| He worked at 'The Ritz' and 'Savoy' hotels in London, where he wrote many cookery books. He created many famous dishes such as 'Peach Melba', 'Melba toast', and the famous ice-cream bombs | | | | | |

Year 8

Design and Technology Pathway

| Catering | | | | | | |
|---|----------|--|--|--|--|--|
| Homework 3 | Due Date | | | | | |
| Read the text below in readiness for a test on this subject | w/c | | | | | |
| How the environment is affected by the Hospitality and Catering industry | | | | | | |
| The catering industry affects the environment in several ways. Food production contributes to climate change. This happens because of the way food is cooked, delivered, produced and stored. Food 'provenance' means where the food comes from and how many miles it has to travel before it reaches the kitchen. This is also known as the 'carbon footprint'. This is because of the CO2 gas that is released into the atmosphere by the industry, when being transported and being produced and cooked. Food being transported is known as 'air miles'. To lower the air miles, a caterer can try and buy locally grown produce (this also helps local farmers). They can also grow their own food and try and use foods that are in season e.g. using strawberries in the summer months. | | | | | | |
| Food packaging has a huge impact on the environment. 13 billion plastic water bottles are used every year, with only 3 billion being recycled. Many disposable packaging products end up in the sea which harms wildlife. Caterers do try and recycle as much as possible but many aren't biodegradable, unfortunately the majority of food packaging uses fossil fuels in their manufacture. | | | | | | |
| When cooking food you should only use the oven and hob when ready, put lids on saucepans to keep in the heat. Hot food shouldn't be put into a fridge and fridge doors should be kept shut to keep them cold inside. | | | | | | |
| Homework 4 | Due Date | | | | | |
| Read the text below in readiness for a test on this subject Different coloured chopping boards | w/c | | | | | |
| Chefs use different coloured chopping boards in a kitchen to prevent bacteria growth and cross contamination. Cross contamination occurs when germs move from one place to another. An example of this would be cutting raw meat on a chopping board and then using the same board and knife to prepare cooked meat. Bacteria also cross over when hands aren't washed between different cooking procedures. | | | | | | |
| Red- Raw meats | | | | | | |
| Yellow- Cooked meats | | | | | | |
| Green – Fruit and salad | | | | | | |
| Blue – Fish | | | | | | |
| Brown- Vegetables | | | | | | |

| Resistant Materials | | | | | | |
|--|----------|--|--|--|--|--|
| Homework 1: Health and Safety investigation | Due Date | | | | | |
| Investigate rules and procedures for different job profiles in the design industry | w/c | | | | | |
| Homework 2: Designers Research | | | | | | |
| Create an interesting, thoughtful and illustrated biography of your chosen person or design company. | w/c | | | | | |
| Alexander McQueen | | | | | | |
| Aldo Rossi | | | | | | |
| Ettore Sottsass | | | | | | |
| Phillippe Starck | | | | | | |
| Alessi | | | | | | |
| A Braun | | | | | | |
| • Diauli | | | | | | |
| work and analyse your examples in terms of personal opinion, materials, aesthetics, costs etc. The work should be shown on no more than 1 side of A4 and must be printed if completed on the computer. | | | | | | |
| Homework 3: Types of Plastics | Due Date | | | | | |
| Create an informative, A4 sheet on thermoplastics and thermosetting plastics. List properties, uses and differences between the different types of plastics. | w/c | | | | | |
| Homework 4: Design Movement Research | Due Date | | | | | |
| Selected from the list, below, create an interesting, thoughtful and illustrated report of your chosen design movement. | w/c | | | | | |
| Art Nouveau | | | | | | |
| • Bauhaus | | | | | | |
| Modernism | | | | | | |
| You will produce a 150 word, edited report and show a good range of examples of the subjects work. Analyse your examples in terms of personal opinion, materials, aesthetics, costs etc. The work should be shown on no more than 1 side of A4 and must be printed if completed on the computer. | | | | | | |
| Homework 5: The history of <u>CLOCKS</u> | Due Date | | | | | |
| On 1 side of A4 paper, create an informative report on the subject of clocks- How do they work? Where did they originate? How are they made? Etc etc -So many questions! | w/c | | | | | |
| Homework 6: Manufacturing Process-How is a fizzy drink plastic bottle and cap made? | Due Date | | | | | |
| Create a flowchart or step by step diagram of how a plastic bottle is made– from the moment the raw plastic is made to the process of moulding it into a bottle shape. | w/c | | | | | |
| You might want to include sketches and photographs to explain your work- you decide! | | | | | | |
| Homework 7: Made in Britain: Henry Hoover | Due Date | | | | | |
| https://www.youtube.com/watch?v=I3_x8Gw_BDE | w/c | | | | | |
| https://www.itv.com/watch/made-in-britain/2a5692/2a5692a0007 Using the 'Made in Britain' worksheet, watch the video clip, read and answer the questions. The worksheet will also be accessible via Microsoft Teams or speak to your teacher. | | | | | | |
| Homework 8: Industrial Processes | Due Date | | | | | |
| Research the process of vacuum forming acrylic – how does it work? | w/c | | | | | |
| Write up 'step by step' how the vacuum forming process is done | | | | | | |
| Homework 9: Design Task | Due Date | | | | | |
| Rescared the design company byson and sketch your own design for a new vacuum cledier in- | | | | | | |

| Resistant Materials | |
|--|--|
| Homework 10: Product Analysis | Due Date |
| Research the Alessi- 'Alessandro' Corkscrew created by Alessandro Mendini. Use the work- sheet provided to analyse the product using ACCESSFM. | w/c |
| Homework 11: Life cycle Assessment-Reading and Test | Due Date |
| Read through and revise the information on 'Sustainability and the Life Cycle Assessment' for products. Be ready for a test in you next lesson. | w/c |
| Homework 12: Sourcing Plastics- Reading and Test | Due Date |
| Read through and revise the information on 'Sourcing Plastics' on 2 pages. Be ready for a test in you next lesson. | w/c |
| Homework 13: Specialist Techniques and Processes | Due Date |
| Use the informative sheet on 'Specialist Techniques and Processes' to complete the table. Add a sketch/drawing to represent the manufacturing process. Add a description which explains the process. | w/c |
| Homework 14: Flowchart– Use of a scroll saw | Due Date |
| Complete the activities on using the scroll saw safely. | w/c |
| Homework 15: Key terms in the Workshop | |
| | Due Date |
| Look up key words and terms, commonly used in the design workshop and explain their meanings- in your own words. | Due Date w/c |
| Look up key words and terms, commonly used in the design workshop and explain their meanings- in your own words. Homework 16: Production Systems– Reading and Test | Due Date w/c Due Date |
| Look up key words and terms, commonly used in the design workshop and explain their meanings- in your own words. Homework 16: Production Systems– Reading and Test Read through and revise the information on 'CAD (Computer Aided Design) and CAM' (Computer Aided Manufacture). Be ready for a test in you next lesson. | Due Date w/c Due Date w/c |
| Look up key words and terms, commonly used in the design workshop and explain their meanings- in your own words. Homework 16: Production Systems– Reading and Test Read through and revise the information on 'CAD (Computer Aided Design) and CAM' (Computer Aided Manufacture). Be ready for a test in you next lesson. Homework 17: Making Task– Recycle Packaging | Due Date w/c Due Date w/c Due Date |
| Look up key words and terms, commonly used in the design workshop and explain their meanings- in your own words. Homework 16: Production Systems– Reading and Test Read through and revise the information on 'CAD (Computer Aided Design) and CAM' (Computer Aided Manufacture). Be ready for a test in you next lesson. Homework 17: Making Task– Recycle Packaging Make a prototype 'Storage case' (pen holder, stationary organiser) using packaging that can be recycled such as milk bottle, toilet roll, cereal box etc. Do some research, sketch a design, make your model and take a photo (and bring in the photo to evidence what you have made). | Due Date w/c Due Date w/c Due Date w/c |
| Look up key words and terms, commonly used in the design workshop and explain their meanings- in your own words. Homework 16: Production Systems– Reading and Test Read through and revise the information on 'CAD (Computer Aided Design) and CAM' (Computer Aided Manufacture). Be ready for a test in you next lesson. Homework 17: Making Task– Recycle Packaging Make a prototype 'Storage case' (pen holder, stationary organiser) using packaging that can be recycled such as milk bottle, toilet roll, cereal box etc. Do some research, sketch a design, make your model and take a photo (and bring in the photo to evidence what you have made). Homework 18: 3D Sketching | Due Date w/c Due Date w/c Due Date w/c W/c Due Date |

Resistant Materials Homework Checklist

Once finished, tick off the homework you have completed. Remember to keep your work safely stored in your class folder

| Homework 1: Health and Safety investigation | |
|---|--|
| Homework 2: Designers Research | |
| Homework 3: Types of Plastics | |
| Homework 4: Design Movement Research | |
| Homework 5: The history of <u>CLOCKS</u> | |
| Homework 6: Manufacturing Process-How is a fizzy drink plastic bottle and cap made? | |
| Homework 7: 'Made in Britain: Henry Hoover' | |
| Homework 8: Industrial processes | |
| Homework 9: Design task | |
| Homework 10: Product analysis | |
| Homework 11: Life Cycle Assessment-Reading and test | |
| Homework 12: Sourcing Plastics- Reading and test | |
| Homework 13: Specialist Techniques and Processes | |
| Homework 14: Flowchart– Use of a scroll saw | |
| Homework 15: Key terms in the workshop | |
| Homework 16: Production Systems– Reading and test | |
| Homework 17: Making Task– Recycle packaging | |
| Homework 18: 3D Sketching | |

| Health and Safety Investigation | | | Name: | |
|---|---------------------------|---------------------|-------------------------|--|
| 1. Circle which job profile you will choose: | 3.Draw safety signs whic | ch you would displa | y in the workplace of t | he job profile chosen and discuss why. |
| Sophie: Tailor Archer: Builder Joe: Carpenter | | | | |
| 2. On the body template below state which (PPE) personal pro tective equipment needed for the iob profile chosen. | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | 4. Complete a Risk Assess | ment for your chos | en job profile | |
| | Hazard | Risk | People at risk | Control Measure |
| Mon All | | | | |
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Made in Britain: Henry Hoover Series 1 Episode 7





Explain how from the mass produced to the hand crafted, we can take a look a behind the scenes look at how Britain's most iconic brands are made. Discover and understand how the famous Henry vacuum cleaner is made - his friendly face can be found in millions of homes, hotels and offices around the world.



Use links below to access the episode:

https://www.itv.com/watch/made-in-britain/2a5692/2a5692a0007

https://www.youtube.com/watch?v=I3_x8Gw_BDE

Made in Britain: Henry Hoover Series 1 Episode 7



Answer these questions:

Where are 'Henry Hoovers' made?



What type of plastic do they use to make the hoover?

What is injection moulding?

Which is the most complicated part to make?

How is the smiley face made?

What are the names of the other hoovers you can get in the series?

What are the different tools you can in the 5 piece accessory kit for the hoover?

What automation is used to assemble the hoover?

How are the hoovers tested ready for use?

How many hoovers do they make in a day?



We use ACCESS FM to help us write a specification - a list of requirements for a design - and to help us **analyse and describe** an already existing product.

ACCESS FM - Helpsheet





is for Material



O

Aesthetics means what does the product look like? What is the: Colour? Shape? Texture? Pattern? Appearance? Feel? Weight? Style?

Cost means how much does the product cost to buy? How much does it: Cost to buy? Cost to make? How much do the different materials cost? Is it good value?



Customer means who will buy or use your product? Who will buy your product? Who will use your product? What is their: Age? Gender? What are their: Likes? Dislikes? Needs? Preferences?



Environment means will the product affect the environment? Is the product: Recyclable? Reuseable? Repairable? Sustainable? Environmentally friendly? Bad for the environment? 6R's of Design: Recycle / Reuse / Repair / Rethink / Reduce / Refuse



Size means how big or small is the product? What is the size of the product in millimeters (mm)? Is this the same size as similar products? Is it comfortable to use? Does it fit? Would it be improved if it was bigger or smaller?



Safety means how safe is the product when it is used? Will it be safe for the customer to use? Could they hurt themselves? What's the correct and safest way to use the product? What are the risks?



Function means how does the product work? What is the products job and role? What is it needed for? How well does it work? How could it be improved? Why is it used this way?



Material means what is the product made out of? What materials is the product made from? Why were these materials used? Would a different material be better? How was the product made? What manufacturing techniques were used?

SUSTAINABILITY

Sustainability looks to protect and maintain the needs of the present without compromising the ability of future generations to meet their needs.

Designers now have a better understanding of which materials are sustainable, which are not, and the effect that overharvesting and overconsumption has on the planet.

Finite resources

Finite resources are in limited supply and are being used more quickly than can be replaced. Use of finite resources should be avoided where possible or used only in small amounts for essential reasons where an alternative cannot be used. Fossil fuels, some minerals and metal ores are examples of finite resources.

Non-finite resources

Non-finite resources are in abundant supply and are unlikely ever to be exhausted. They can be grown or replaced at the rate that they are being used. Examples include solar and wind energy, timbers and cotton.

Life Cycle Assessment

Conducting a **Life Cycle Assessment** (**LCA**) is a way for companies to assess the environmental impact of a product during the different stages of a product's life.

1. Extraction and processing: The amount of energy used to extract raw material from the earth, or to produce it through farming or other methods, and process it ready for manufacturing.

Life Cycle Assessment (LCA)

4. Use

2. Manufacturing and production:

The energy required to manipulate the raw and refined materials into a product ready for sale.

5. End of life



3. Distribution:

The packaging and transportation of the product to the end user.

Waste disposal

Careful planning of **waste disposal** has many positive effects, particularly in large scale manufacturing plants. Waste materials can be reused internally for alternative parts and products. Some of the cost of materials is recouped through the sale of recyclable waste. The energy used to heat and power a business may also be generated from waste material such as biomass.

SOURCES AND ORIGINS

Man-made polymers are referred to as plastics. Plastics are derived from coal, gas, cellulose and commonly crude oil. Crude oil needs to be processed before use.



STOCK FORMS, TYPES AND SIZES

Plastics are produced in a range of stock forms, to meet the many uses for manufacturing such as blow moulding, injection moulding and line bending.



Film Used for packaging, bags, labels and sheeting.



Granules / pellets Used for extrusion and injection moulding.



Foam Flexible or rigid. Used for thermal insulation and packaging.



Rods / tubes Used in electrical, plumbing, garden, military and medical applications. Can be bent to shape.



Powder

Mixes well with additives and dyes. Also used in resin glues, spray coating and 3D printing.



Sheet

Durable and lightweight. Used for protective surfaces, roofing and signage. Can be cut to size, bent, curved or vacuum formed.

Standard dimensions

Dimensions are given in mm.

Standard dimensions for **sheet** are given as length \times width \times thickness.

Rod – diameter × length. **Tube** – diameter × length plus the thickness of the wall or the **gauge**.

Granules and powders are measured by weight in mg.

SPECIALIST TECHNIQUES AND PROCESSES





Plastic sheet is placed above the mould and clamped securely



which becomes flexible



The air is vacuumed out below the plastic and mould

Vacuum forming

This technique is used to shape plastic. It works by heating a sheet of plastic. which is then pulled by the vacuum to form around the shape or mould. Once the plastic has cooled and set hard it can be removed from the moulding tool.

3D printing

The 3D printing process builds a three-dimensional object formed from reels of thermoplastic. 3D printers use CAD files which are converted into a series of co-ordinates called G-code that the printer will follow to build up the object in layers.

It is also known as additive manufacturing, as the material is added in layers.



Drape forming

Plastic sheet is heated to a softened state, where it can be formed over a mould. It takes on the shape of the mould without stretching the plastic and retaining the dimensional thickness. It is a slow tool process without the need for a vacuum, so is low cost, but it does take time. It is typically used for components with a gentle curve such as motorcycle windscreens and bath panels.



Injection moulding

Products such as bottle caps, toys and automotive parts are produced with injection moulding. Molten material is injected into a mould. Once the plastic has cooled and set hard, the mould is opened to release the shape.

Injection moulding can handle complex parts and shapes to produce consistent products in large quantities

The process can be automated for a high output rate which helps with cost efficiencies



Welding

Plastics can be joined by welding. Heat softens the polymers and they can be joined with a plastic filler material in the form of a long thin cable.

The heat source comes from hot gas welding guns which produces a thin jet of hot air to soften the polymers. Other techniques include laser and friction welding.

Solvent plastic welding can also be used to partially dissolve the plastics, so that they can bond together.



Blow moulding

eated plastic is

extruded into a hollow tube (parison)

A tube of softened plastic, known as a parison is fed into a hollow mould. The parison is pinched at the bottom so it can be filled with warm air and inflates to fill the mould, taking on the shape This method is used for plastic bottles and containers.



r inflates

the pariso

Mould closes

to grip

parison

opens

Parison fills

the mould and cools

Finished

| Use the informative sheet on 'Specialist Techniques and Processes' to complete the table below Process Sketch/Drawing Description | | | | | | | | | |
|---|----------------|-------------|--|--|--|--|--|--|--|
| Process | Sketch/Drawing | Description | | | | | | | |
| Vacuum Forming | | | | | | | | | |
| | | | | | | | | | |
| 3D Printing | | | | | | | | | |
| Drape Forming | | | | | | | | | |
| Injection Moulding | | | | | | | | | |
| Welding | | | | | | | | | |
| Blow Moulding | | | | | | | | | |



Scroll Saw

| Keyword/Term | Meaning |
|-----------------------------|---------|
| Design | |
| Resistant Materials | |
| Sustainability | |
| Iterative Design | |
| Polymer | |
| Batch Production | |
| CAD (Computer Aided Design) | |
| Tenon Saw | |
| Design Fixation | |
| Aesthetics | |
| Life Cycle Assessment | |
| Crating | |
| Orthographic Projection | |
| Deciduous Trees | |
| Design Client | |
| Injection Moulding | |
| Quality Control | |

Homework 16: Production Systems- Reading and Test



Production Systems — CAD/CAM

CAM Machines Can be Used on Different Materials

- There are CAM machines out there for all kinds of jobs fear not...
- Some CAM machines are <u>2-axis</u> they only use x and y coordinates so can only cut out <u>2D shapes</u>.
- 3) Others are <u>3-axis</u> machines these use x, y, and z coordinates so they can cut out <u>3D shapes</u>

be used to engrave things. CNC routers can be used on plastics, wood and metals. different sized cutting tools — they're either 2-axis or 3-axis machines. They can also CNC routers are able to cut out either 2D or 3D shapes from a block of material using

objects. Die cutters (see p.67) are also used to cut out shapes from sheet materials. only cut through sheet materials - they're 2 axis machines so they can't cut out 3D material. On lower power settings they can be used for engraving. Laser cutters can fabrics and some metals. Laser cutters on high power settings cut right through the Laser cutters are used to cut things — they can be used on plastic, wood, cardboard

design from an image on screen into a <u>3D model</u>. They can be used to It's also increasingly being used to manufacture final products print with several different materials including plastic and wax (see p.87). <u>3D printers</u> can be used for rapid prototyping — they convert your

prototyping on more about p.147-148. There's

CAD/CAM is Good for Global Companies

- 1) Nowadays it's easy to communicate with people all over the world via phones and the internet as a result businesses can operate <u>across the world</u>. It's also easy to transport goods around the globe.
- These factors combined with the development of CAD/CAM has affected manufacturing in two main ways:





CAD/CAM can offer lots of <u>benefits</u> to companies — these include the benefits of <u>automation</u> covered on page 2. However, there are drawbacks too which include the fact that computers can be affected by <u>viruses, software problems</u> and <u>file corruption</u>, which could potentially <u>slow down</u> production

have become more widely available recently. The thought of 3D printing a custom dog bowl on your kitcher CAD and CAM are all the rage in designing products these days. 3D printers have been around a while but Remember, CAM machines make the designs that are drawn in CAD...

Homework 18: 3D Sketching

EXERCISES. Study the two drawings and complete the table by matching the numbered surfaces of the orthogonal drawing with the lettered surfaces of the isometric drawing.



Use the space below to draw one of the shape examples using orthographic projection:

Notes