AUTUMN TERM

- ALESSI KEY FOB LIGHT
- IPHONE STAND

YEAR 10 -AUTUMN

REVISION TOPICS

- Alessi
- CAD
- CAM
- Electronic Components (IPO)
- Flow Diagrams
- AI and Programming
- User Interfaces
- Material Properties
  - Working
  - Physical
- Consumer Choice
  - Market Pull
  - Technology Push
- Polymers
  - Thermoforming
  - Thermosetting
- Papers and Boards
  - Types
  - Stock forms and properties
  - Finishing techniques
- Designers
  - Philippe Starck
  - Matthew Williamson
  - Apple
  - Dyson
  - Airbus
- Life cycle assessment

YEAR 10 – KEY FOB	DESIGNER FOCUS - ALESSI

KEY QUESTIONS

1. WHAT ARE THE THEMES/STYLE OF ALESSI PRODUCTS?
2. WHAT COLOURS/FINISHES ARE MOST COMMONLY USED?
3. WHAT SHAPES/FEATURES ARE USED THROUGHOUT THE BRANDS DESIGNS?

YEAR 10 – KEY FOB

DESIGNER FOCUS - ALESSI

YEAR 10 – KEY FOB	COMPUTER AIDED DESIGN

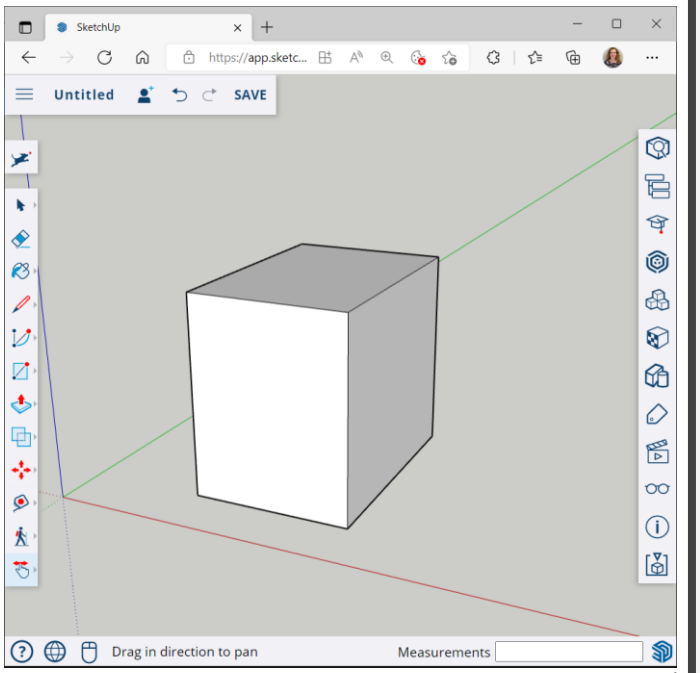
KEY QUESTIONS

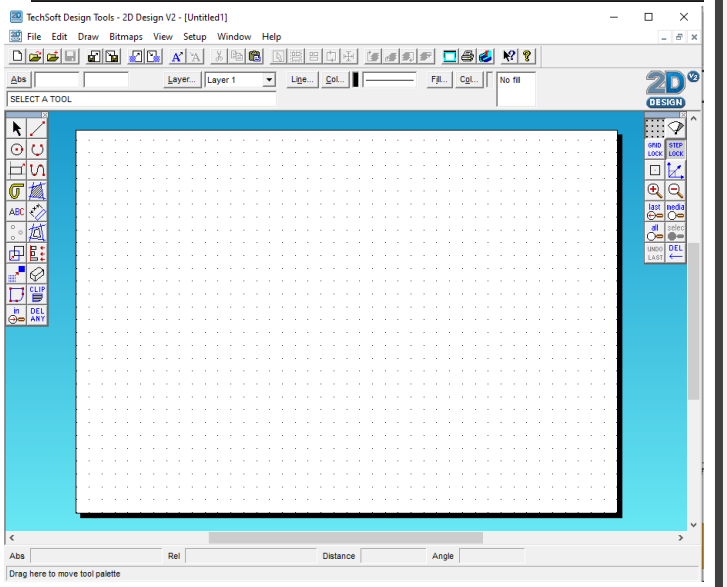
1. WHAT IS COMPUTER AIDED DESIGN?
2. WHAT ARE THE ADVANTAGES OF CAD?
3. WHAT ARE THE DISADVANTAGES OF CAD?
4. WHAT ARE SOME COMMON EXAMPLES OF CAD?

YEAR 10 – KEY FOB | COMPUTER AIDED DESIGN

COMPUTER AIDED DESIGN IS THE PROCESS OF USING SOFTWARE TO PRODUCE DRAWINGS –EITHER IN 2D OR 3D

Advantages	Disadvantages
Ideas can be drawn and developed quickly	Expensive to set up
Designs can be viewed from all angles and with a range of materials	Needs a skilled workforce
Some testing and consumer feedback can be done before costly production takes place	Difficult to keep up with constantly changing and improving technology
It becomes easier to design and test a range of ideas	Computers can fail





YEAR 10 – KEY FOB	COMPUTER AIDED MANUFACTURE

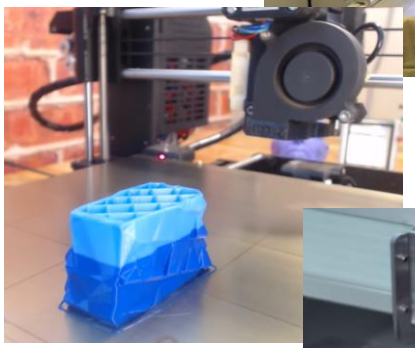
KEY QUESTIONS

1. WHAT IS COMPUTER AIDED MANUFACTURE?
2. WHAT ARE THE ADVANTAGES OF CAM?
3. WHAT ARE THE DISADVANTAGES OF CAM?
4. WHAT ARE SOME COMMON EXAMPLES OF CAM?

YEAR 10 – KEY FOB

COMPUTER AIDED MANUFACTURE

COMPUTER AIDED MANUFACTURING USES COMPUTERS TO CONTROL EQUIPMENT THAT MANUFACTURES.



Advantages of CAM	Disadvantages of CAM
Fast and accurate production	Expensive to set up
Machines can run constantly on repetitive tasks	Needs a skilled workforce of engineers
Good for producing on a mass/flow production line	Downtime required for maintenance
Less material wastage	Computers and machines can fail

YEAR 10 – KEY FOB	INPUTS AND OUTPUTS

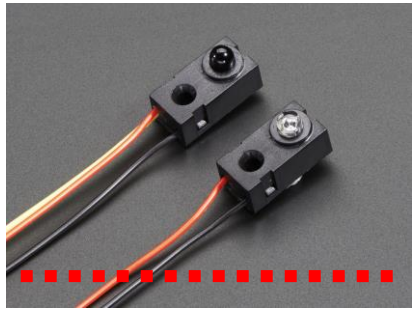
KEY QUESTIONS

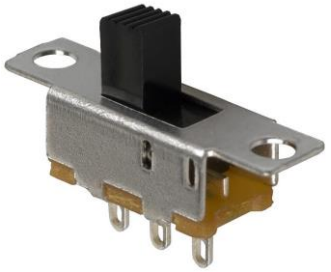
1. WHAT ARE INPUTS OR OUTPUTS?
2. WHAT DO INPUTS DO?
3. WHAT ARE SOME COMMON INPUTS AND OUTPUTS?

YEAR 10 – KEY FOB

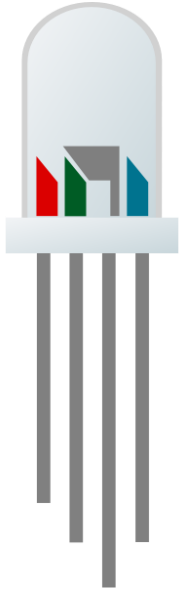
INPUTS AND OUTPUTS

Input: a place where, or a device through which, energy or information enters a system (often sensors or switches)





Output: a place where power or information leaves a system.



YEAR 10 – KEY FOB	FLOW DIAGRAMS

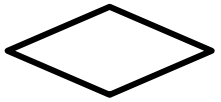
KEY QUESTIONS

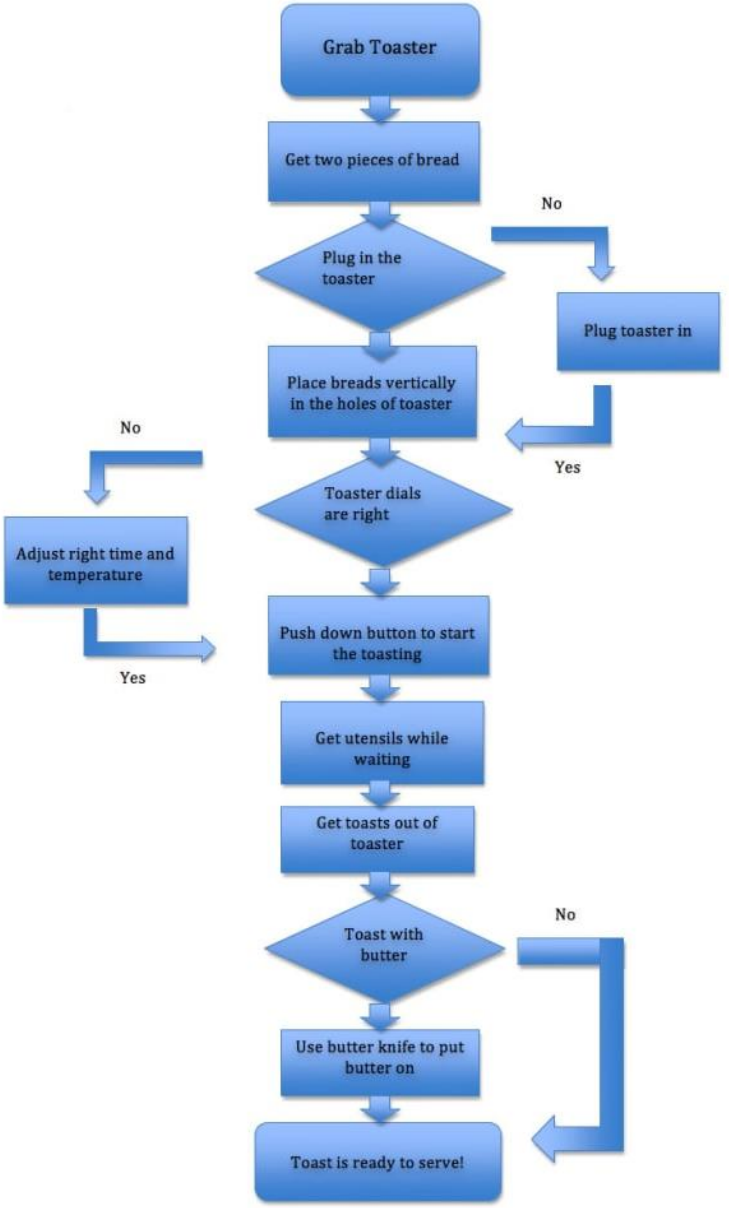
1. WHAT ARE FLOW DIAGRAMS USED FOR?
2. WHAT DO THE SHAPED BOXES MEAN?
3. WHAT ARE THE CONVENTIONS WHEN DRAWING FLOW DIAGRAMS?
4. WHAT ARE FEEDBACK LOOPS AND WHY ARE THEY IMPORTANT?

YEAR 10 – KEY FOB

FLOW DIAGRAMS

Flow diagrams can be used to document a process to understand it more clearly – and sometimes spot inefficiencies

Symbol	Name	Function
	Start/End	An oval or lozenge represents a start or end point
	Arrows	Line is a connector that shows relationships between the shapes
	Input/ Output	A parallelogram represents input or output
	Process	A rectangle represents a process
	Decision	A diamond indicates a decision (used to create feedback loops)



YEAR 10 – KEY FOB	AI / PROGRAMMING

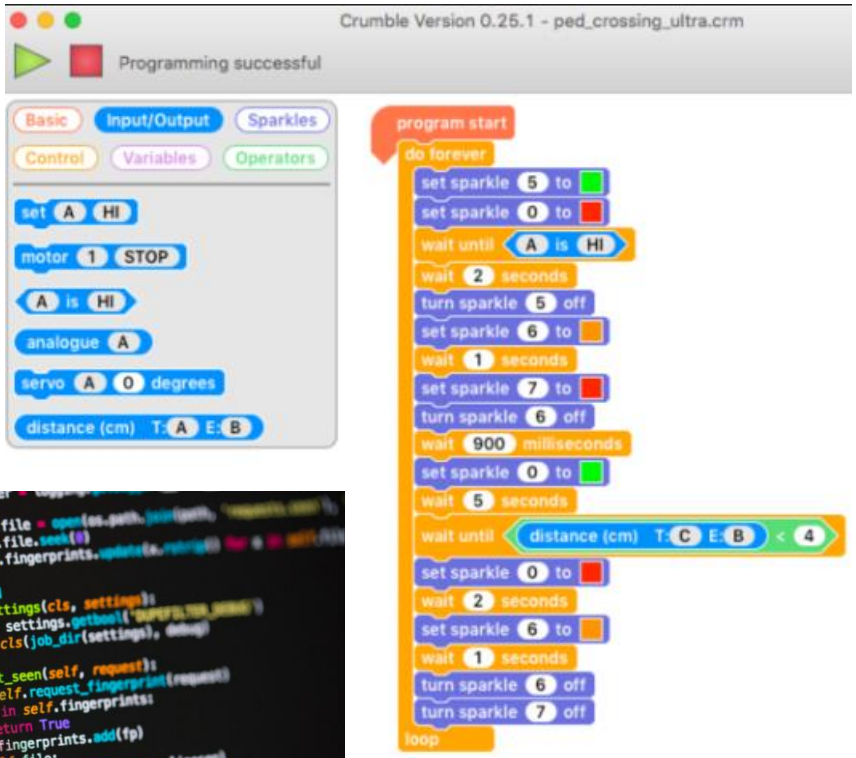
KEY QUESTIONS

1. WHAT IS “ARTIFICIAL INTELLIGENCE”?
2. WHAT IS PROGRAMMING?
3. HOW CAN YOU PROGRAMME A MICROPROCESSOR?

YEAR 10 – KEY FOB

AI / PROGRAMMING

Artificial Intelligence: the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.



Programming: giving a set of instructions to a computer to execute

Software such as **“crumble”** or **“scratch”** use blocks to control inputs/output.
Programming languages such as “**Python**” can be used for more complex projects

YEAR 10 – KEY FOB	USER INTERFACES/IOT

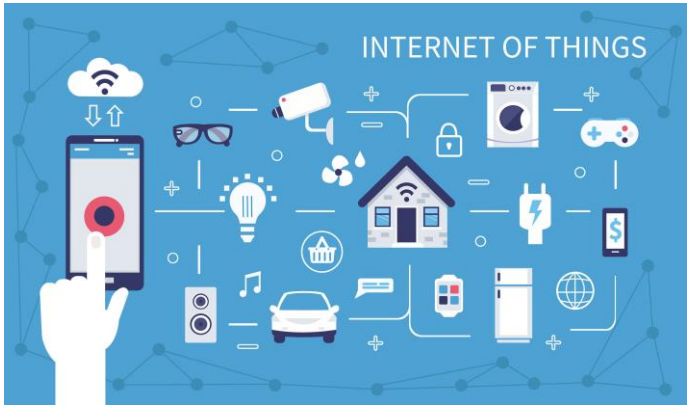
KEY QUESTIONS

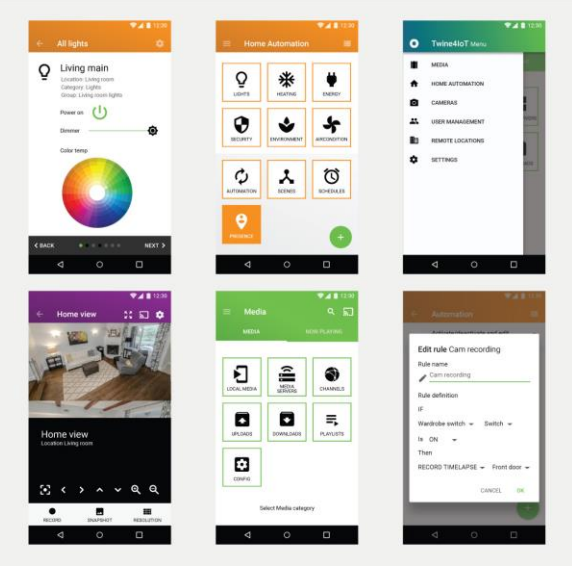
1. WHAT IS THE “INTERNET OF THINGS” (IOT)?
2. WHY ARE USER INTERFACES HELPFUL?
3. WHAT MAKES A GOOD USER INTERFACE?

YEAR 10 – KEY FOB

USER INTERFACES/IOT

INTERNET OF THINGS: the interconnection via the internet of computing devices embedded in everyday objects, enabling them to send and receive data:





USER INTERFACES: Allow users to control connected device, in a simple user friendly way. Removing the need to know programming, making devices intuitive to use.

YEAR 10 – KEY FOB	MATERIAL PROPERTIES

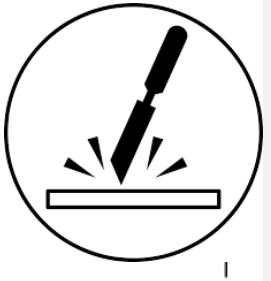
KEY QUESTIONS

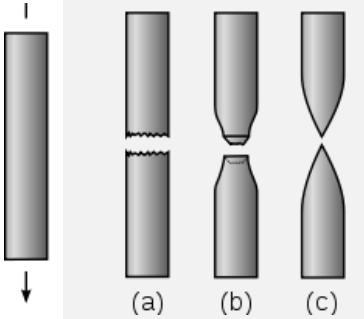
1. HOW ARE THE PHYSICAL PROPERTIES OF MATERIALS DESCRIBED?

YEAR 10 – KEY FOB | MATERIAL PROPERTIES

Physical properties are the traits a material has before it is used.

- **absorbency** - the ability to soak up moisture, light or heat, eg natural materials (such as cotton or paper) tend to be more absorbent than man-made materials (such as acrylic or polystyrene)
- **density** - how solid a material is. This is measured by dividing mass (grams) by volume (cm^3), eg lead is a dense material
- **fusibility** - the ability of a material to be heated and joined to another material when cooled, eg webbing is fusible and can be ironed onto fabrics
- **electrical conductivity** - the ability to conduct electricity, eg copper is a good conductor of electricity
- **thermal conductivity** - the ability to conduct heat, eg steel is a good heat conductor, whereas pine is not





YEAR 10 – KEY FOB	MATERIAL PROPERTIES

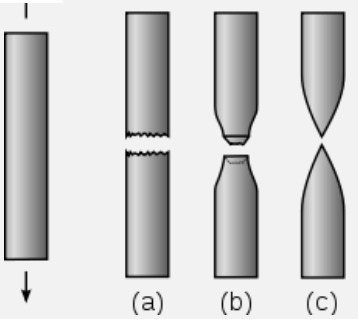
KEY QUESTIONS

1. HOW ARE THE WORKING PROPERTIES OF MATERIALS DESCRIBED?

YEAR 10 – KEY FOB | MATERIAL PROPERTIES

Working properties are how a material behaves when it is manipulated.

- **strength** - the ability of a material to withstand compression, tension and **shear**, eg in woven fabrics cotton isn't as strong as wool when pulled
- **hardness** - the ability to withstand **impact** without damage, eg pine is easier to dent with an impact than oak; therefore, oak is harder
- **toughness** - materials that are hard to break or snap are tough and can absorb shock, eg Kevlar in bulletproof vests is a very tough material
- **malleability** - being able to bend or shape easily would make a material easily malleable, eg sheet metal such as steel or silver is malleable and can be hammered into shape
- **ductility** - materials that can be stretched are ductile, eg pulling copper into wire shows it is ductile
- **elasticity** - the ability to be stretched and then return to its original shape, eg elastane in swimming costumes is a highly elastic material



YEAR 10 – KEY FOB	CONSUMER CHOICE

KEY QUESTIONS

1. WHAT IS TECHNOLOGY PUSH AND SOME PRODUCT EXAMPLES?
2. WHAT IS MARKET PULL AND SOME PRODUCT EXAMPLES?
3. WHAT IS THE “RIGHT TO REPAIR”?

YEAR 10 – KEY FOB

MATERIAL PROPERTIES

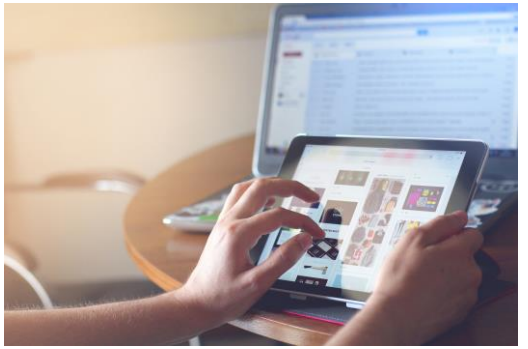
Technology push vs. Market pull

Technology push

Research & Developement → Production → Marketing → Need?

Market pull (demand pull)

Research & Developement → Production → Marketing → Expressed Market Need



YEAR 10 – KEY FOB	THERMOFORMING POLYMER

KEY QUESTIONS

1. WHAT ARE THERMOFORMING POLYMERS?
2. WHAT ARE SOME COMMON EXAMPLES AND THEIR USES?
3. WHAT ARE THE COMMON PROPERTIES?

YEAR 10 – KEY FOB | THERMOFORMING POLYMER

Thermoforming polymers can be heated and formed repeatedly. They are **pliable** and **recyclable**

Because…

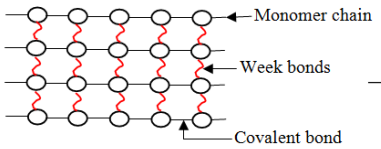


Figure 1. Thermoplastic polymer

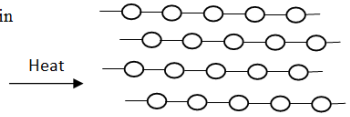


Figure 2. Thermoplastic softened state

Behaves like….

Thermoforming polymer	Properties	Uses
Acrylic (PMMA)	Hard with good plasticity when heated so can be folded well, resists weather well but is brittle and scratches easily, available in lots of colours	Car headlights, visors and baths
High density polythene (HDPE)	Stiff, strong but lightweight, good plasticity when heated with excellent chemical resistance	Washing-up bowls, pipes, chairs, buckets and bottles
Polypropylene (PP)	Lightweight but strong and tough, has good heat and chemical resistance	Computer game cases, chairs, children's toys and food packaging film
Polyvinyl chloride (PVC)	Can be matt or high gloss with both chemical and weather resistance, low in cost with good strength, can be made to be flexible or rigid	Window frames, building cladding, guttering

YEAR 10 – KEY FOB	THERMOSETTING POLYMER

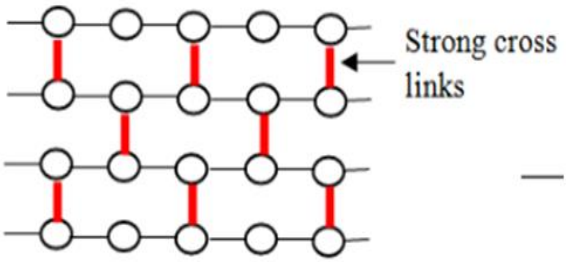
KEY QUESTIONS

1. WHAT ARE THERMOSETTING POLYMERS?
2. WHAT ARE SOME COMMON EXAMPLES AND THEIR USES?
3. WHAT ARE THE COMMON PROPERTIES?

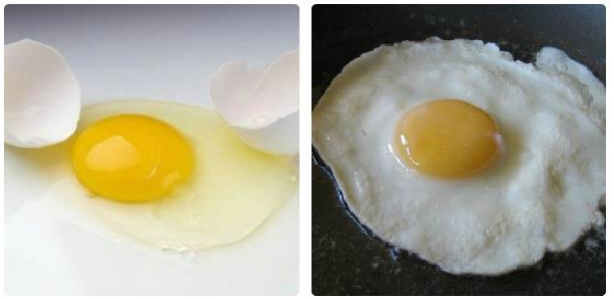
YEAR 10 – KEY FOB | THERMOSETTING POLYMER

Thermosetting polymers are **brittle** and can only be formed once. They are hard to recycle. They are good **insulators** and are resistant to heat and chemicals.

Because…



Behaves like….



Thermosetting polymer	Properties	Uses
Epoxy resin (ER)	Supplied as two parts, one resin and one hardener (see image) - the resin and hardener combine to create an extra-strong adhesive, good chemical and heat resistance and an excellent thermal insulator, can be brittle	Bonds materials and can be used for waterproof coatings and lamination
Melamine formaldehyde (MF)	Excellent heat resistance as well as being resistant to scratching and staining, hard and strong	Laminates for worktops, food safe so used for picnic tableware
Urea formaldehyde (UF)	A hard and stiff polymer with excellent thermal insulation	Electrical fittings, toilet seats, holding the wood chips together in the making of medium-density fibreboard (MDF)

YEAR 10 – KEY FOB	PHILIPPE STARCK

KEY QUESTIONS

1. WHAT IS PHILLIPPE STARCK KNOWN FOR?
2. HOW HAS HE INFLUENCED INDUSTRY?
3. WHAT PRODUCTS DID HE DESIGN?

YEAR 10 – KEY FOB

PHILIPPE STARCK

Starck has worked across a range of design disciplines, buildings, rooms, furniture, boat, lamp toothbrush, clothing, electronic device. His philosophy is to improve people's life both aesthetically and in quality.

He has collaborated with numerous companies: Flos, Alessi, Hansgrohe, Microsoft, Virgin and also creates independently. He promotes healthy lifestyle, ecological debate through material choices.

Notable designs: **Juicy Salif Lemon Squeezer** - Alessi (1990) , **Louis Ghost Chair -** Kartell (2002), **Hot Bertaa Kettle -** Alessi (1987)

YEAR 10 – KEY FOB	MATTHEW WILLIAMSON

KEY QUESTIONS

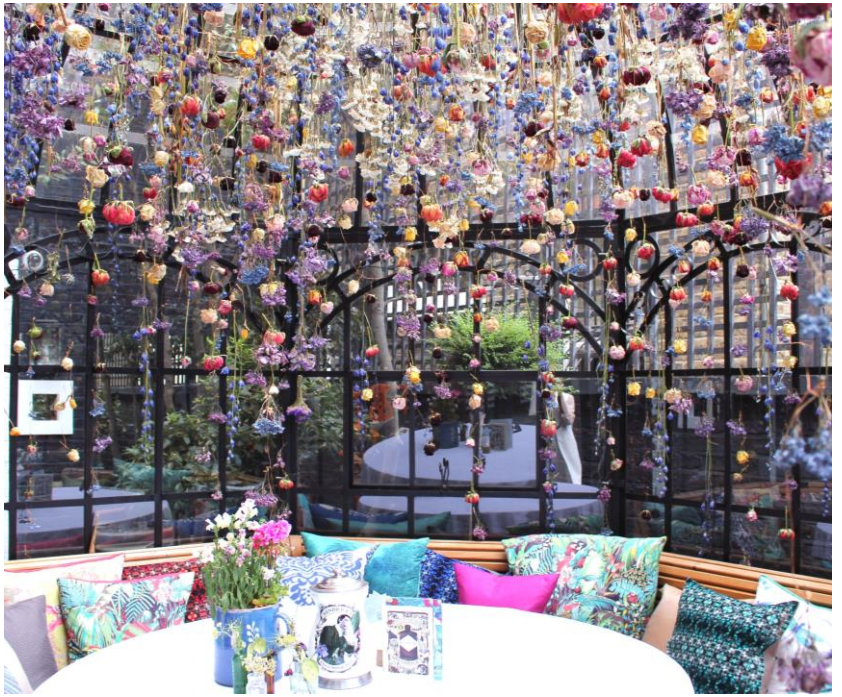
1. WHAT IS MATTHEW WILLIAMSON KNOWN FOR?
2. HOW HAS HE INFLUENCED INDUSTRY?
3. WHAT PRODUCTS DID HE DESIGN?

YEAR 10 – KEY FOB

MATTHEW WILLIAMSON

Matthew Williamson is an award-winning, British interior designer known predominantly for his unique and unrivalled use of pattern and colour. Having begun his illustrious career in fashion under his namesake brand for over 20 years, Matthew has drawn on his decades of experience and pivoted seamlessly into the world of interior design. He now develops several homeware collections to sit alongside his growing residential and commercial interior design portfolio.

Notable designs: **IKAT Pouffe, Peacock Lamp Base, range of maximalist wall papers.**



YEAR 10 – KEY FOB	DYSON

KEY QUESTIONS

1. WHAT IS DYSON KNOWN FOR?
2. HOW HAS THE COMPANY INFLUENCED INDUSTRY?
3. WHAT PRODUCTS DID DYSON MANUFACTURE?

YEAR 10 – KEY FOB

DYSON

Dyson has descried the company approach as “design is first and foremost an engineering company. Our main concern is developing and commercializing products that are more effective than those that are already on the market. Our motto remains fairly simple, we constantly question the things that exist and we think about how we could improve them. This process takes avenues that may seem illogical at first, but they do deliver results in the end. Our engineers enjoy solving problems that others have ignored. All this to say that technology comes ahead of design. Our desire to create beautiful objects is in no way essential. We are guided by practicality and not appearance.”

Dyson’s focus on function followed by form has yielded a range of exceptionally effective, consistently Styled products, aimed at making life Easier.

Notable designs:

Dyson DA001/DC01 (1993),
Dyson Airblade (2006),
Dyson Zone (2022)

YEAR 10 – KEY FOB	APPLE

KEY QUESTIONS

1. WHAT IS APPLE KNOWN FOR?
2. HOW HAS THE COMPANY INFLUENCED INDUSTRY?
3. WHAT PRODUCTS DID APPLE MANUFACTURE?

YEAR 10 – KEY FOB

APPLE

The following statements sum up the Apple approach to design – most of these relate to when Jony Ive was the primary designer for the company:

Design takes depth
Good design is revolutionary
Complex simplicity
The pain of “no”
Inspiration not imitation
Sweat the detail

Notable designs:
iPhone (2007)
MacBook Air (2008)
AirPods Max (2020)

YEAR 10 – KEY FOB	AIRBUS

KEY QUESTIONS

1. WHAT IS AIRBUS KNOWN FOR?
2. HOW HAS THE COMPANY INFLUENCED INDUSTRY?
3. WHAT PRODUCTS/SERVICES IS AIRBUS KNOWN FOR?

YEAR 10 – KEY FOB

AIRBUS

In the **feasibility** and **concept** phases, market expectations and requirements are explored. Different options are combined to come up with an overall aircraft concept with the latest technologies, structural concepts and systems architectures. The result is a product specification to start detailed design of parts and the specification of system elements from equipment suppliers. The characteristics of the product are simulated in extensive detail.

During the **design** phase, the definition and dimensioning of all elementary parts and their interfaces are performed, and the equipment, engines and landing gear are developed by the supply chain.

In the **integration** and **qualification** phases, parts are produced and assembled – both for test specimens on test benches and for the first aircraft that will serve the flight test programme. The tests are organised as a pyramid, going from lab tests at a small scale (via integration tests for checking the behaviour of complete systems) to full-scale structural tests and flight tests. The goal of all these tests is to verify predicted behaviour of the systems, structure and aircraft and to demonstrate their ability to sustain conditions well exceeding what is expected during the life of the aircraft – including also all conceivable failure cases.

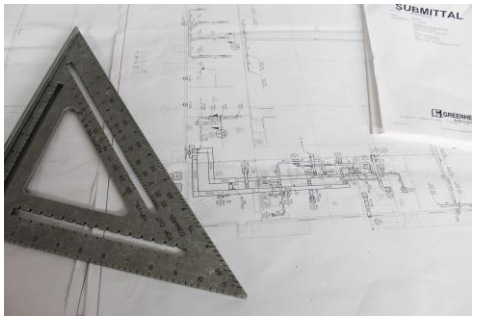
YEAR 10 – KEY FOB	PAPERS AND BOARD

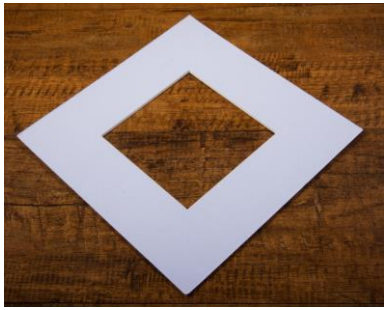
KEY QUESTIONS

1. WHAT ARE THE MOST COMMON TYPES OF PAPERS AND BOARDS?
2. WHAT ARE SOME COMMON USES FOR EACH TYPE OF PAPER?

YEAR 10 – KEY FOB

PAPERS AND BOARD





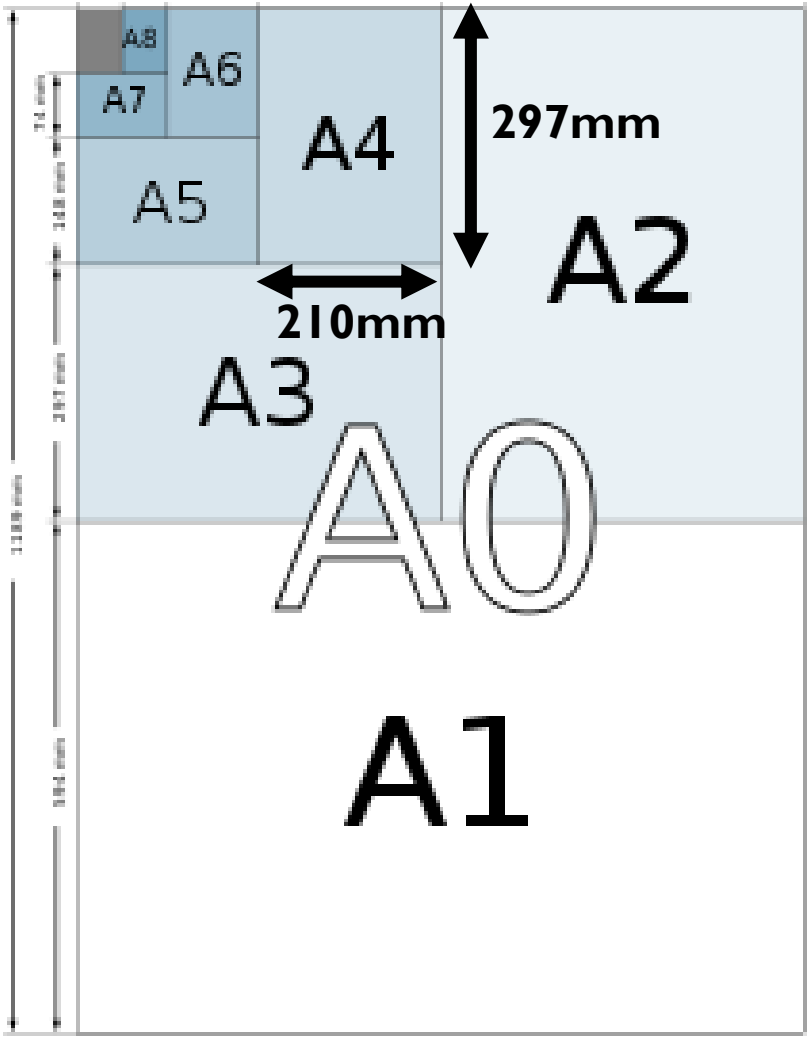
YEAR 10 – KEY FOB	PAPERS AND BOARD

KEY QUESTIONS

1. HOW ARE PAPERS AND BOARD SOLD? (STOCK FORMS)
2. WHAT ARE THE USEFUL MEASUREMENTS RELATING TO PAPERS AND BOARDS

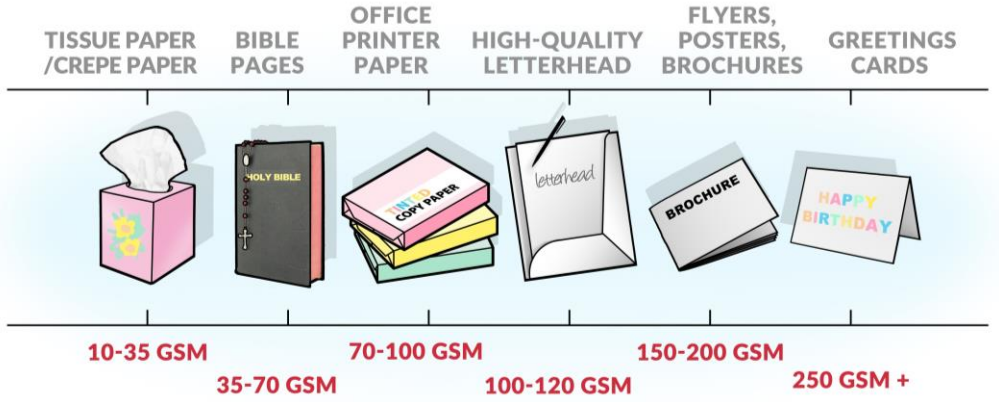
YEAR 10 – KEY FOB

PAPERS AND BOARD



STANDARD DIMENSIONS

WEIGHT – GRAMS PER SQUARE METRE (GSM)



THICKNESS - MICRONS

SOLD BY ROLL/ SHEET

YEAR 10 – KEY FOB	PAPERS AND BOARD

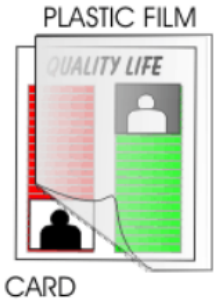
KEY QUESTIONS

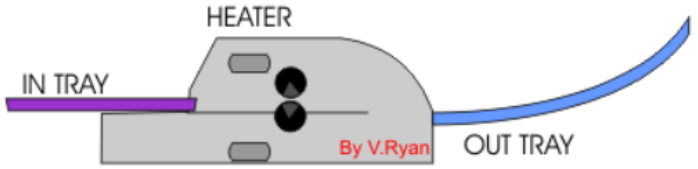
1. HOW CAN YOU IMPROVE THE PERFORMANCE OF PAPER AND BOARDS?
2. WHAT FINISHING TECHNIQUES CAN BE APPLIED?

YEAR 10 – KEY FOB

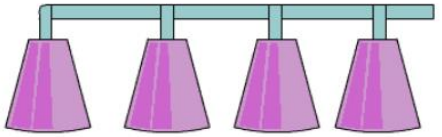
PAPERS AND BOARD

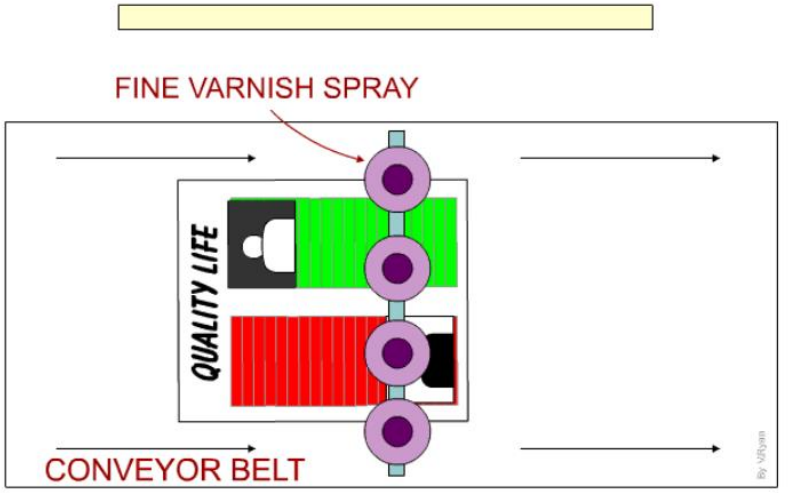
LAMINATION/ ENCAPSULATION



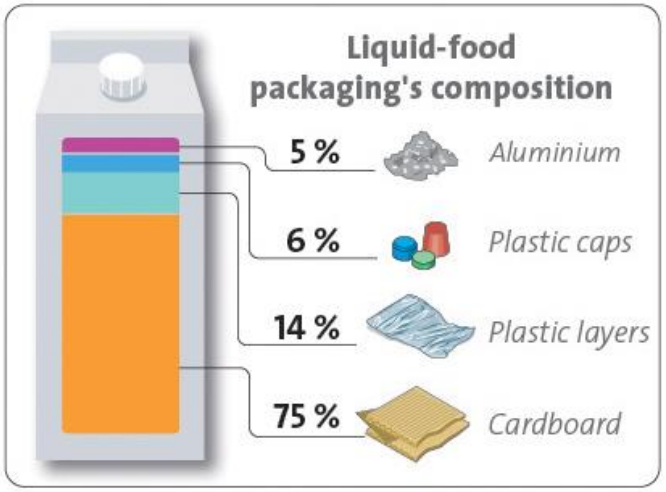


PRINTING AND VARNISHING





TETRA PAK



YEAR 10 – KEY FOB	PAPERS AND BOARD

KEY QUESTIONS

1. WHAT METHODS ARE THERE FOR JOINING PAPER BASED MATERIALS?

YEAR 10 – KEY FOB

PAPERS AND BOARD