

Students learn to use a variety of design and presentation techniques include CAD on PC and iPad. As well as sketching and drawing by hand and modelling.

1 H/W
Fig 1

2 H+S
→ Remember to wear H+S equipment including an apron and safety goggles.

3 Find a workpiece that is small enough to fit on the saw table, but bigger than the desired material length.
→ You want a board or plank?

Fig 2

4 Within the saw table, there are various zones designated with safety points:

Fig 3

danger zone

safe

• Within the danger zone, workmen hands and fingers should not be placed as they are at risk of being cut. Instead, use push sticks

Fig 4

5

Fig 5

rotating blade

• Carefully push the workpiece towards the blade, remembering to mark the workpiece and the cut line on it. Move the piece towards the blade along the cut line

6

Fig 6

▨ - excess
□ - desired

- Sometimes a curved or zigzag cut line may be required
- The way to achieve these cuts is to:
 1. keep the pressure on the workpiece constant but release slightly at turning points.
 2. For a smooth curve, release pressure slightly and turn the piece along the cut line
 3. For a zigzag, keep pressure constant and cut triangles into the piece as shown in Fig 6.

Students learn to use specialist equipment required for completing the practical elements of their exam. Producing data sheets for each piece of studied equipment

I'm not sure the wording is correct. "measuring impact through recyclability".

Solar Power washing robot

Name: Sanju Karthikeyan Sustainability

24/09/24

Discuss the impact that disposable products have on the environment

Disposable products can have a negative effect on the environment, as they disturb the natural habitats and break the balance of an ecosystem. For example, the batteries present in disposable vapes contain lithium, which is mined from countries like large open quarry mines. This not only depletes the natural resources through the removal of trees and the implementation of roads, but the heavy machinery also contributes to the noise pollution. This disrupts the lives of nearby species which have a negative effect upon the environment.

→ **Direct impact of specifically disposable vapes/batteries**

Furthermore, these disposable products also contribute greatly to global warming, because more than 40% of the products, due to their construction, they need to be transported from the manufacturing plant, to the assembly line, to the store, then they are left behind, waiting for the consumer to throw away, which again requires transportation to get rid of the waste, after contributing to landfill. This transportation is mostly done through a combustion engine that uses carbon based fuel, which releases harmful greenhouse gases, such as CO₂, nitrogen oxides, which contribute to global warming. The Earth, which causes climate change and climate change changes habitats, such as the polar ice caps, having a negative impact on the environment.

This is very general - What about the you using it?

It is also argued that disposable products are not entirely having a negative impact on the environment compared to other materials. For example, in fizzy drink cans, some aluminium is used as the casing. It is almost always recycled, 45% of the aluminium ends up being still in circulation today, so it is.



Discussing a full LCA of disposable vapes impact on the environment

2. What are the government guidelines/legislation regarding their disposal?

Must be the responsibility of the manufacturer

Q2) Batteries continued:

of household electronics are also prone to requiring lots of energy, where more fossil fuels are burnt and released to pollute the planet. The WEEE Directive, sometimes considered to be a bit of a nuisance, provides a benefit that the WEEE Directive provides is the 'waste-bin' labelling system, in which a crossed out waste bin must be displayed on an electronic product to indicate that it must not be normally disposed of. The impact of this in manufacturing is crucial, as it provides them with an incentive to reduce the use of toxic, non-workable materials in the manufacture of electronics, in order to avoid having their non-disposable label.

→ **How do they provide convenient recycling for consumers?**

The WEEE Directive provides some sustainable environmental benefits to the manufacture of electronic hand tools, although it acts only as an influence which cannot fully change harmful or toxic materials and manufacturing processes.

→ **Are holding them to account...**

What other directives/schemes do manufacturers comply with? RHS, BSI, take-back.

If there is not a crossed out waste bin, consumers can conveniently recycle electronic products at home. However, in this case, consumers are given the opportunity to give such products to shops, supermarkets and other convenient disposal points.

Certain heavy metals such as cadmium and mercury in electronics are these are toxic, whilst it is true that the WEEE Directive has a positive impact on the safety of consumers, it must be said that manufacturers continue to use materials which negatively impact the environment despite WEEE regulations. Metals such as copper used in electronic wiring must be extracted from the earth, contributing to the enhanced greenhouse effect through the release of toxic gases and having a permanent scar on the planet's ecosystem. Furthermore, processes such as extraction and die-casting in the manufacturing process.

(continued behind this page)

This question needed to be more manufacturers responsibility, rather than environmental impact schemes.

Q3. Using specific product examples explain the impact of legislation on the design of electronic products

→ **Explain the impact of legislation on the design of electronic products**

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First of all, the Reducing Hazardous Substances Directive (a law from 2006) is legislation which banned the use of certain toxic metals and materials in electronic manufacturing, such as lead, cadmium and mercury. Whilst it is true that this legislation is able to protect the safety of consumers against toxic metals, it does not completely help environmental initiatives to prevent extraction of metal which damages the environment by releasing toxic gases to contribute to the enhanced greenhouse effect, as well as permanently scarifying and polluting the natural ecosystem. It does not ensure

Q2 6 marks continued:

of household electronics are also prone to requiring lots of energy, where more fossil fuels are burnt and released to pollute the planet. The WEEE Directive sanctions manufacturers for doing this.

Despite this, a benefit that the WEEE Directive provides is the 'wheeler-bin' labelling system, in which a crossed out wheeler bin must be displayed on an electronic product to indicate that it must not be normally disposed of. The impact of this on manufacturers is crucial, as it provides them with an incentive to reduce the use of toxic, non-wastable materials in the manufacture of electronics, in order to avoid having this non-disposable label. **How do they provide convenient recycling for consumers?**

The WEEE Directive provides some sustainable environmental benefits to the manufacture of electronic hand tools, although it acts only as an influence which cannot fully change harmful or toxic materials and manufacturing processes. **How do they provide convenient recycling for consumers?**

What other directives/schemes do manufacturers comply with?
RMS, BSI, take-back.

If there is not a crossed out wheeler bin, consumers can conveniently recycle electronic products at home. However, if this is not the case, consumers are given the opportunity to give such products to shops, supermarkets and other convenient disposal points.

Knowledge and understanding are checked with low stakes exam style questions with feedback coming from teacher marking, self marking using published mark schemes and peer marking. Students make note in green pen to correct or expand on answers.

This also builds exam technique.

certain heavy metals such as cadmium and mercury in electronics, as these are toxic. Whilst it is true that the WEEE Directive has a positive impact on the safety of consumers, it must be said that manufacturers continue to use materials which negatively impact the environment despite WEEE regulations. Metals such as copper used in electronic wiring must be extracted from the earth, contributing to the enhanced greenhouse effect through the release of toxic gases, and leaving a permanent scar on the planet's ecosystem. Furthermore, processes such as extrusion and die-casting in the manufacture

WEEE prevents this where possible from having to account.

*** This question needed to be more manufacturers responsibility, rather than environmental impact scheme. Explain the take back scheme. Acted in part 1 of book report.** (10 marks)

First of all, the Reducing Hazardous Substances Directive (a law from 2006) is legislation which banned the use of certain toxic metals and materials in electronic manufacture, such as lead, cadmium and mercury. Whilst it is true that this legislation is able to protect the safety of consumers against toxic metals, and can somewhat help environmental initiatives to prevent extraction of metal (which damages the environment by releasing toxic gases to contribute to the enhanced greenhouse effect, as well as permanently scarring and polluting the natural ecosystem), it does not remove

24/09/24
Name: Sanjiv Kumar Singh, Sustainability
Discuss the impact that disposable products have on the environment.
Disposable products can have a negative effect on the environment, as they disrupt the natural balance and break the balance of an ecosystem. For example, the batteries present in disposable nappies contain lithium, which is mined from a country in large open quarry mines. This not only destroys the natural ecosystem through the removal of trees and the implementation of roads, but the heavy machinery also contributes to the noise pollution. This disrupts the lives of nearby species which has a negative effect upon the environment. **Direct impact of specifically disposable vapour batteries**
Furthermore, these disposable nappies also contribute to global warming, as the packaging, which is made from plastic, does not biodegrade. They need to be transported from the manufacturing plant, to the assembly line, the stores, then they are left lying around the consumer's house, away from the origin, requiring transportation to get rid of the waste, often contributing to landfill. This transportation is mostly done through a combustion engine that uses carbon based fuel, which releases harmful greenhouse gases, such as CO₂, nitrogen dioxide, which contribute to global warming on the Earth, which causes climate change. This climate change causes habitats, such as the polar ice caps, becoming a negative impact on the environment. **This is very general - what products are you using?**
However, it has also been argued that disposable products are not entirely having a negative impact on the environment compared to cars. For example, in fact, they are recycled 95% of the time. It is almost always recycled. **5**
I'm not sure the wording is correct. "minimising impact through recyclability".
Teacher comment: Discussing a full LCA of disposable vapour impact on the environment. Must be the responsibility of the manufacturer. 2. What are the government guidelines/legislation regarding their disposal?

Discuss the impact that disposable products have on the environment.

Disposable plastic products such as single-use water bottles when not recycled end up in landfill. This is **Rephrase** **damaging** for the environment as **over time** PET and other plastics can leach toxic chemicals into the land, damaging it even further. This may **disrupt** animal habitats and bits of plastic may end up being ingested by animals **damaging** their **organs**. Furthermore, when disposable plastic products are made **from** crude oil, **and when treated** CO₂ and other greenhouse gases are released, contributing to the global warming. **General not PET specific.**

Products such as aluminium cans are also disposable and again if they end up in landfill as the aluminium is **very thin** when broken down sharp edges may become a danger to animals. However, aluminium cans can be recycled, and this reduces their environmental impact whilst energy is still needed to treat these during the recycling process which is usually sourced from fossil fuels. Recycling means the land does not have to be further damaged when **disposing** and **docking** for **60 days** for recycled **specific material**.

What is the aluminium statistic? **Recycled + biodegradable**

Long-term products that are disposable (wooden) cutting also from a tree as it is disposed of after a single use and all raw materials are constantly needed to **re-manufacture** **new ones**. **Recycled + biodegradable**

(Trees) must be cut down to source the timber and this can lead to a loss of **deposition** when on a larger scale as **deforestation** destroys animal habitats and makes land infertile **reducing** biodiversity. Trees also act as carbon sinks, so cutting them down will contribute to global warming by increasing CO₂ levels in the air.

14

Rewrite paragraphs 1 and 3, in detail, specific details and fully discuss materials LCA. Use a 6K



Which type?

Material sustainability debate. For A Level, must draw on real product examples. Comparing sustainability of one material vs another. Teacher annotates areas where improvement is needed in red pen. Student responds to feedback and follow on tasks in green pen.

Plan:

Plastics - e.g. water bottles.

Aluminium cans -

Disposable plastic products such as single-use water bottles **have** when not recycled end up in landfill. Leaching toxic chemicals into the soil can make it infertile, and PET will remain for thousands of years taking up space and damaging the environment. As a thin material, PET may be ingested by **even** local wildlife, **damaging** their internal organs, as well as the landfill sites taking up space and reducing the land for animal habitats, **re** further decreasing biodiversity in some areas.

...

Disposable **cutting** wooden cutting made out of pine may pose a risk as it is a high demand product which **may** means that due to the constant disposal, there must be a high rate of production **to** **be** **met** so the pine trees must constantly be cut down and **soon** **formed** **in** **wood** **machined** into the shapes needed. This is **an** **en** Trees being cut may increase the rate of deforestation, **with** **destroying** natural habitats and **forcing** out native species. On top of this, trees act as carbon sinks, **which** **is** and so cutting them down increases the CO₂ levels, contributing to global warming. Furthermore, the machining processes are extremely energy intensive, reliant on fossil fuels.

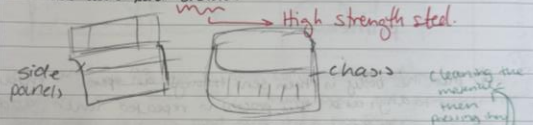
Mini Cooper Manufacture Question

15/25

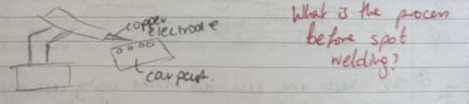
Multiple flat aluminium sheets are press formed into various parts of the car, forming a skeleton of the car.
Plan:

- Press formed chassis and skeleton - joined with spot welds.
- Die cast engine blocks and parts
- Paint
- Die cast wheels
- Imported parts
- Internal wiring and system done by hand

Multiple flat aluminium sheets are press formed with a CNC machine. These form a skeleton of the car, including the side doors and chassis.



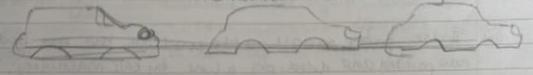
These parts are joined together with spot welds. This is done by CNC operated robots which will move and form multiple parts at one in cells.



What is the process before spot welding?

Individual parts are then joined to form a skeleton of the car with hundreds of spot welds. This is then put on a line to be fitted with extra parts, including the engine.

How are the spot welds made?



The engine and internal parts are die casted using CNC machinery so that many can be done formed.

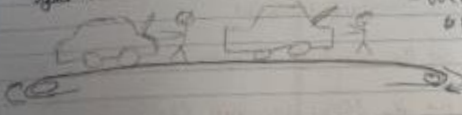


At this point, the doors of the car are removed, again using CNC machinery. This makes it easier to access the inside for the next few steps.



The interior of the car is now completed, including wiring, surfaces and the seats. These are all produced and imported from other factories and fitted into the interior by CNC machinery.

Once complete, on a line the wiring is completed by hand. Workers must work quickly and move along a place whilst the line of cars moves to different stations. During this time the engine is connected as well as the electronic systems.



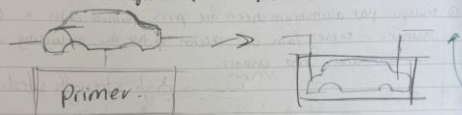
Once complete, the doors are added again, either 2 (one main side) or 4 (2 doors on each side) depending on customer specification. This is done by CNC machinery.

The car is now moved on a line where it is quality checked.

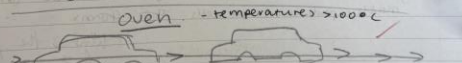
Parts such as the windows, mirrors and handles may be imported from other factories, as well as some international ones. These parts can then be joined to the skeleton.

The body is now formed and sent to be painted in another part of the factory. Based on customer specifications, the body is painted with different combinations of the many available colours.

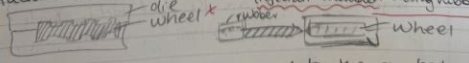
First, the parts get coated in primer. This is done by dipping them into a vat of the required liquid.



Then the body is then sent through an oven on a line through an oven to dry, and this process is repeated when adding the multiple coats of paint, and then finally a finishing coat to protect and seal the surface.



The wheels are also die casted using CNC machines, creating different designs according to customer specifications. The tyres may be sourced from other factories and attached to the wheels by hand or may be injection moulded using rubber.

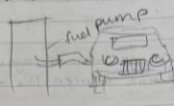


These parts are all attached to the car body, now painted and dried, on a line by CNC machinery.

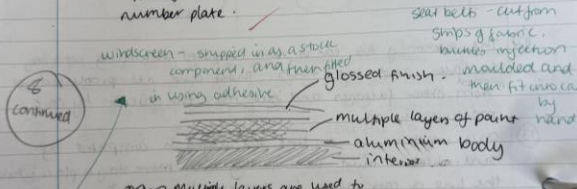
rotary casting - die casting (but by hand)
look at last page
What is the process used for casting alloys called?

What is the stage of the process of making tyres?

for deformities or problems which case it is removed. This is done by hand. The car is then filled with fuel, with different volumes depending on whether it is for international travel or not.



The car is then driven off by employees and undergoes final safety checks at which point the product is then shipped off to the car retailer who will add the number plate.



Multiple layers are used to ensure that the surface of the car is protected and the colour won't fade or easily get damaged.

How are the cars buffered after they are painted?

How are the following components fitted?
 harness, seat belts, windscreen, steering wheel!
 steering wheel - stock components shipped in
 harness and electronic components - done
 fitted by hand on at stations where
 along a belt

seat belts - cut from strips of fabric, built-in injection moulded and men fit into car by hand
 windscreen - shipped in as a stock component, and then fitted with adhesive
 glossed finish - moulded and men fit into car by hand
 multiple layers of paint
 aluminium body interior
 in with
 with
 as
 they get
 a machine

As part of their exam students produce a step-by-step plan of manufacture for a given product. For success in this, students must consider:

- Quality control/Quality Assurance
- Scale of production
- Materials and detailed manufacturing processes
- H&S

1. Explain the advantages and disadvantages of making greater use of renewable energy sources to power products and systems.



One advantage is that renewable energy is much better for the environment. For example, using solar energy from solar panels reduces the usage of fossil fuels which release CO₂ into the atmosphere when combusted and requires drilling to extract. Less CO₂ emissions from renewable energy sources mean that ^{there is a} ~~less~~ ^{benefit}

^{less} ^{contribution} ^{to the} ~~enhanced greenhouse effect and climate change.~~ However, a disadvantage is that it is less reliable, as if there was a heavy storm, solar panels would be covered and so power production and systems would not have a source of power. Furthermore, land also ^(Total 8 marks) has to be cleared for renewable resources, such as dams and hydroelectricity which can disturb the habitat of many species by not reducing biodiversity.

Good answer!

What are the environmental factors associated with solar energy?

- ~~But~~ Materials needed - metal ores drilled

Materials - Metals ores have to be drilled - mining land

Glass - methods need to be treated

Space - land has to be cleared to place them