

Disassembly

Time: 30 minutes

Group

Purpose

To learn why it is important to design products that can easily be disassembled.

Background to the task

On average each person throws away about 500kg in rubbish in a year. Every year in the UK we produce over 430 million tons of waste. Over a million tons of this is electrical and electronic goods.

Much of this could be recycled. But you can only recycle single materials. To make recycling possible goods must be designed so that they can easily be taken apart and the materials of the different components easily identified.

This is called 'design for disassembly'.

Another advantage of designing for disassembly is that if a component fails, it is easy to replace it rather than replacing the whole product.

WEEE stands for Waste Electronic Electrical Equipment. This can be anything from computers (one million are thrown into landfill sites each year!) to mobile phones, fridges and washing machines. But all of these have metals or plastics in them that can be recycled – if they can be disassembled.

Cars are also being redesigned so that at the end of their lives they can be taken apart easily and the components reused or recycled.

The EU (European Union) has rules covering the disposal of cars, electrical and electronic goods.

Carrying out the task

1. Divide into groups.
2. Look at the STEP website www.stepin.org. Some groups should find the case study on Smart™ Car; other groups the one on Identifying Plastics.
3. Work through the case study – discuss in your group how you might answer **one** of the following questions:
 - Is smart™ more sustainable than most other cars, and if so, why?
 - Why is the Tribopen a useful product, and how does it work?
4. Your group is to prepare a quick presentation on it

Teachers' notes

More background information

- The life span of electrical goods is very short so the volume of goods is increasing.
- WEEE (Waste Electronic Electrical Equipment) is made up of many complex materials. Disposing of the product is very difficult; recycling is even harder and re-use is bounded by legislation.
- As a result large amounts of WEEE are shipped to developing countries (especially the Far East and China) for recycling. But no legislation is in place for monitoring the process. In China for instance, electronic goods are burnt and the waste precious metals collected. The individuals who do this work in very poor conditions and breathe in the toxic fumes that are given off. Arsenic poisoning is common and the health of the workers who operate from their own homes is very poor.
- The larger the product the easier it is to recycle, e.g. white goods such as fridges etc. are easier to recycle than mobile phones. .
- Mobile phones contain potentially poisonous batteries that must be removed before recycling or disposal, as do LCDs.
- Many of the products contain dangerous materials such as arsenic, lead, nickel, cadmium, bromine, mercury and PCB's.
- For more information on WEEE choose the information side of <http://www.informationinspiration.org.uk/> and click onto 'legislation'.

Materials needed

Access to computers with Internet connections OR a printout of the STEP case studies on Smart™ Car and the Tribopen (listed under 'Identifying plastics').

Extensions

1. The STEP case study on the Smart™ Car provides a good example of design for disassembly. Ask students to look at this and then to write PART OF a specification for a mobile phone that is designed for disassembly. They should write only the disassembly bit – not the full specification! The Nokia website has useful information on disassembly but it is not easy to find! This is partly because Nokia has different websites for different countries. We recommend <http://www.nokia.com.ph/nokia/0,8764,44595,00.html>. This is a page from their Philippines site. It may be worth asking some more able students to explore the Nokia sites to see what they can find.

2. Over a period of one term ask the students to collect any items of WEEE that they can and bring them into school. Choose the smaller items! Also ask them to let you know about any larger items that are being thrown out.

- As a group collect the data and prepare a graph of all the items that the families in the class have thrown away in a term.
- Disassemble one product that has been brought in, e.g. Hair dryer and try and identify the materials have been used. Produce a graph as a group to highlight which materials are being thrown away and which materials could be recycled.