



SNS COLLEGE OF TECHNOLOGY



New Product Development

Unit 4

Design for the Environment

Text book

Kevin Otto and Kristin Wood ,” **Techniques in Reverse Engineering and New Product Development**”



DFE

∞ **Design for the Environment (DfE)** is a design approach to **reduce the overall human effort and environmental impact of a product**, process or service, where impacts are considered across its life cycle.



Why DFE?

- ❧ Modern day businesses all aim to produce **goods at a low cost** while maintaining quality, staying competitive in the global marketplace, and meeting consumer preferences for more environmentally friendly products.
- ❧ To help businesses meet these challenges, EPA encourages businesses to incorporate environmental considerations into the design process.



❧ The benefits of incorporating DFE include:

- cost savings,
- Reduced business risks and
- Environmental risks,
- Expanded business and
- Market opportunities, and
- To meet environmental regulations.



Environmental objectives

- ❧ Protect the biosphere
- ❧ Sustainable use of resources
- ❧ Reduction and disposal of waste.
- ❧ Wise use of energy
- ❧ Risk reduction
- ❧ Marketing of safe products and services.
- ❧ Damage compensation
- ❧ Disclosure
- ❧ Environmental directors
- ❧ Annual audit.



🌀 Global issues

- ❑ Climate change
 - Increase in green house gases
 - Burning of fossil fuels, increase in CO₂.
- ❑ Ozone depletion
 - Fluorocarbon gases.
- ❑ Biodiversity loss

🌀 Regional and local issues

- ❑ Acid rain
- ❑ Air pollution



Techniques to reduce environmental impact.



- ∞ Design to **minimize material usage**
- ∞ Design for **disassembly**
- ∞ Design **for recycling.**
- ∞ Design for **remanufacturing.**
- ∞ Design to **minimize hazardous materials.**
- ∞ Design for **energy efficiency.**
- ∞ Design to **regulations and standards.**



Design to minimize material usage



- ∞ Reduce the amount of material used in product.
- ∞ Material reduction in three areas:
 - Packaging and distribution factors.
 - Production system factors.
 - Product itself.



Design for disassembly

- ∞ Design for Disassembly is a technique design the product to be disassembled for **easier maintenance, repair, recovery and reuse of component** and material reduce the environmental impact and increase the value of end-of-life products and enabled to recent advances technologies and is needed to support current organization needs for faster innovation product development cycles combined with products.
- ∞ The design for disassembly is necessary condition for products to be economically recycled, by improving components and material reuse and remanufacture processes, extending the service life of the products and component and product may be disassembled to enable maintenance, enhance serviceability and to affect end of-life



Design for disassembly



INTRODUCTION

“Design for Disassembly (DFD) is the process of **designing** products so that they can be easily, cost-effectively and rapidly taken apart at the end of the product's life so that components can be reused and/or recycled.”





 design for
disassembly





- A framework of actions
- It involves designing a product to be disassembled for easier maintenance, repair, recovery and reuse of components/materials.
- A part of Design for the Environment (DFE) and sustainable product design.





WHY DESIGN FOR DISASSEMBLY



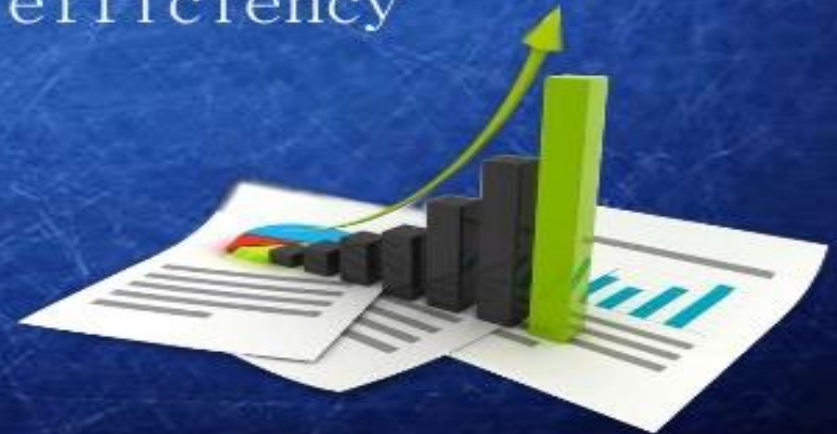


design for
disassembly

- Reduce production costs.



- Greater technical efficiency





design for
disassembly

- Greater flexibility during product development
- Reducing the scale of resources





Design for recycling.

Recycling is important because...



- It reduces the number of fresh raw materials we use
- It reduces the amount of energy we use
- It reduces air pollution
- It reduces water pollution
- It lowers the amount of greenhouse gases



Did you know....

During your lifetime, you will produce so much trash that it will weigh 600 times as much as you. This would fill many trucks.



Examples of Recycling

- ◆ Reusing plastic bags when you go to the supermarket
- ◆ Recycling paper so it can be processed and used again
- ◆ Melting food cans made from steel and making them into new food cans
- ◆ Instead of throwing away uneaten food, you can *compost* it



Compost

- Compost is an earthlike material. It forms when organic materials biodegrade (are broken down by worms and bacteria).
- Compost is great to use in your garden: it returns nutrients to the soil and helps your plants to grow.





What do you think we can recycle?





We Can Recycle...

- COMPOST
- METALS
- GLASS
- PLASTICS
- PAPER





NO please **DO NOT** place these items in your yellow bin:



Plastic bags & film (cling wrap)
*not even those marked
recyclable - only rigid plastics
marked 1-5 are recyclable.



Polystyrene, foam
Eg. meat trays, foam cups.



Pyrex, window glass and
other non-packaging glass
incl. drinking glasses, mirrors,
spectacles, light bulbs, etc.



Ceramics, crockery & pottery
incl. cups, plates, etc.
These can be hazardous,
please place in your red bin.



Non-recyclable plastics
incl. toys, garden hoses,
inflatable toys, cassettes,
videos, xrays, mobiles, etc.



Food scraps,
greenwaste & garbage
incl. clothing, **NAPPIES**,
timber etc.



Non-packaging metals incl. appliances,
fencing wire (only cans & tins are recyclable)



Hazardous waste incl. syringes,
gas cylinders, etc.



REDUCE REUSE RECYCLE

You can help by
learning about
and practicing
the “three R’s”
of waste
management





Reduce

- **Reduce/Reduction:**

to make something smaller or use less.
The result is a smaller amount of waste.

HOW

- Only buy what you need, and use everything that you buy
- Buy products that don't have much plastic packaging and buy things like recycled paper
- Use reusable bags at supermarkets



Reuse

You can "reuse" materials in their original form instead of throwing them away. You can also give materials to others who could use them after you.

HOW

- Use washable cups or travel mugs
- When you use things like plastic cups, plates, and plastic food storage bags, don't throw them away! Wash and reuse them.



Recycle

Remember the things you use every day that you can recycle!!

- Aluminum cans
- Cardboard
- Electronics
- Glass
- Metal
- Newspaper
- Paper
- Plastic Bottles
- Steel cans



Design for remanufacturing.



Remanufacturing is an end-life-strategy where the product is taken to a central facility and disassembled.

Remanufacturing is a industrial process by which a previously sold, worn, or non-functional product or component is returned to a "like-new" or "better-than-new" condition and warranted in performance level and quality.





Advantages

ADVANTAGES



- Market new product service offerings
- Embrace state-of-the-art manufacturing processes - learning new techniques, investing in people, improving material traceability
- Gather valuable data for product improvements in design and function, and enhance after-sales activities





Disadvantages



DISADVANTAGES

- **COST** cheaper to buy new products than to recondition old ones using conventional purchasing models.
- **IMAGE** - the perception by consumers of remanufactured goods as 'second class' can limit sales growth
- **ADAPTABILITY** remanufacturing is not always the most sustainable strategy for reusing products - for example, where costly reverse engineering of original products is needed, there is a skills shortage or where environmental benefits are higher through the process of recycling or design for recycling.



Thank u