Basic Concepts on Ecodesign

Unit 5: Principles/strategies of Ecodesign

Carmen Fernández Fernández. c.fernandez@cetem.es

At the end of this unit, the student will be able to:

-Know the key strategies of Ecodesign framework
-Know some examples of success

Funded by the Erasmus+ Programme of the European Union

Ecoinnovation Skills for European Designers, Project number: 562573-EPP-1-2015-1-SI-EPPKA2-SSA.
This project has been funded with support of the European Union. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

5.1. Introduction

Within the Ecodesign, a series of strategies are highlighted whose main objective is to help to prevent, reduce and/or minimize the environmental impact of the product, associated to its Life-Cycle. These strategies highlight a number of considerations which should be applied during the development of a new product.

All these strategies are closely related to the Life-Cycle, providing each one applicable principles to each stage through which the product undergoes.

Taking into consideration that all these strategies, which are be defined in this unit, has germinate from the design perspective, their ease of understanding and their clear conceptual approach, make them perfectly valid to carry out different development projects.

Even so, it should be not lose focus on its clear objective, since all the strategies that are going to be developed below act under two fundamental premises:

- Reduce the consumptions of resources (raw materials, components, energy,…)
- Reduce/minimize waste generation

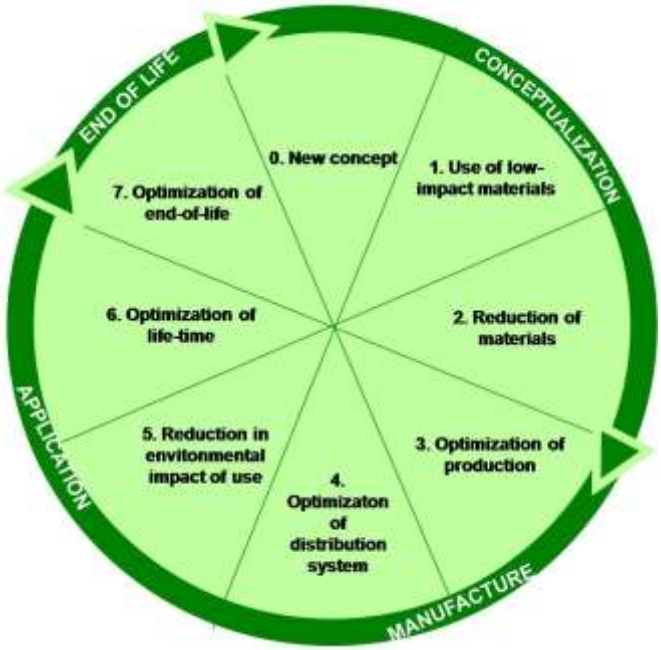
5.2. The eight strategies of Ecodesign

Each product is very different to the rest, from the concept, through its creation process and until reaching its end of use. This causes that each product presents different needs. Assessing the nature of the product is when the strategies to be applied should be selected.

It is important to taking into account that due to the close relationship between the different strategies and the stages of the Life-Cycle, when implementing the strategies, the impact of one stage must be considered and not transferred to another one.

The Lifecycle Design Strategies (LiDS) Wheel enables separate the implementation methodology in 4 differentiated levels:

- Conceptualization.
- Manufacture.
- Application.
- End of life.



Lifecycle Design Strategies (LiDS) Wheel

Each of the levels listed contains the different Ecodesign strategies, according to the corresponding phase.

5.2.1. Strategy 0. New concept

This strategy appears when one of the most important stages in the process, the design stage, is taken into account. It is here when the timely decisions are made regarding the use of this type of strategies. Therefore, it makes perfect sense that this stage is the first.

There, a profound reflection must be carried out on the amount of resources that are going to be consumed by the Product System.

Moreover, one should also reflect deeply on the role to be played by the product itself.

Within this strategy, different sub-strategies can be adopted, such as:

- Dematerialization: this concept is understood as the “reduction of the quantity of matter necessary in fulfilling the function of the product”.
- Multifunctionality: enhancing functionalities as a product.

One of the clearest examples is the multifunction printers, capable of developing multiple functions: printer, scanner, copier, etc.

- Product sharing: maximising the use of product
- Service rather than product: the ability to meet the needs generated by a service, which replaces the use of a product.

Bear always in mind the possibility of changing the approach whereby we meet the previously established requirements.

In the case of the last sub-strategy we are referring to the "design of services". In this case, the goal is that the use is born of the need to perform an action. Thanks to this sub-strategy, a greater awareness of the users is obtained, using the service in a more sustainable way and only when it is strictly necessary.

Bicycle dispenser (www.bikedispenser.com). Source: ecoesmas.com

Delving into the “Multifunctionality”, which is one of the most used sub-strategies, we can also understand it as that characteristic which causes that a product can be useful for several functions without carrying out any modification to it, thus multiplying its possibilities of usage.

Multifunctional stool Kada
(www.danesemilano.com)
Source: ecoesmas.com

Double Life Matalí Crasset
(www.matalicrasset.com).
Multifunctional container
furniture.
Source: ecoesmas.com

5.2.2. Strategy 1. Use of low-impact materials

This is basically to carry out the maximum possible reduction associated with the type of material.

For that purpose, you can make use of the following recommendations:

- ✓ Avoid materials and additives which may affect the ozone layer.
- ✓ Avoid raw materials and very energy intensive components.
- ✓ Look for alternative materials for those who are in danger of disappearing.
- ✓ Analyse the use of surface finishes with low impact.

Within this strategy, different sub-strategies can be adopted, such as the use of:

- o Materials derived from natural sources.
- o Recyclable materials or high recycled content.
- o Materials free of dangerous substances.
- o Materials produced by ecological processes.
- o The minimum possible number of different materials.
- o Materials from local suppliers.

In many cases there will be alternatives of lower impact for the great majority of products that we develop

It is interesting to highlight the sub-strategy of projecting with "only one material". It is intended to simplify both the production process and recycling at the end of the life-cycle.

Obviously, the use of "bio" materials is also always present within an Ecodesign strategy.

Puppy (www.magisdesign.com). Toy and a multifunctional and mono-material decoration product. Source: ecoesmas.com

5.2.3. Strategy 2. Reduction of materials

This is basically to achieve the maximum optimization possible in the quantity of raw materials/ components used in the manufacture of the product. Carrying out a reasonable reduction of material means to produce a product with optimised quantities of materials.

For that purpose, the following recommendations can be used:

- ✓ Optimise weight and volume as far as possible
- ✓ Analyse the possibility of using folding systems
- ✓ Stacking systems
- ✓ Etc.

Within this strategy, different sub-strategies can be adopted, such as the reduction/optimization of:

- Components which, once analysed aspects of functionality, aesthetic and quality, is proved that they do not add real value to the final product.
- Material used (without ever compromising the technical and/or commercial viability of the product).

Always consider if possible "do the same with less"

5.2.4. Strategy 3. Optimization of production

It is based on the evaluation of the production process of manufacturing the product, in order to try to minimise its impact.

For that purpose, these types of recommendations can be used:

- ✓ Try to avoid extra processes of cutting, chip removal, sanding, polishing, welding, etc.
- ✓ Try to avoid extra machining processes.
- ✓ Use, as far as possible, computerised processes.

To keep always in mind that we should strive to use cleaner technologies

Within this strategy, different sub-strategies can be adopted, such as:

- Reduction in the number of production processes.
- Use of alternative production techniques and methods, which are cleaner, more economical, with lower waste productions, etc.
- Minimization of energy consumption. Evaluation of the possibility of replacing current energies by others renewable sources.
- Reduction of waste and wastages, increasing its lifetime through recycling and reuse (either the product as a whole or its components).

5.2.5. Strategy 4. Optimization of distribution system

It is based on a supply chain and distribution approach based on the greatest possible reduction in the impact of packaging (quantity, material, subsequent management, etc.) and by the means of transport used.

For that purpose, these types of recommendations can be used:

- ✓ Send the disassembled product, so that the assembly is carried out at the destination.
- ✓ Study and optimization of cargo (in trucks, containers, etc.)
- ✓ Study and optimization of the road routes to be followed (in the delivery process)
- ✓ Use of reusable packaging.

- ✓ Use of low-impact packaging and easy subsequent management.

Within this strategy, different sub-strategies can be adopted, such as the reduction/minimization and use of:

- The amount of packaging material/protections used.
- Weight of the product.
- Volume occupied in storage and transport.
- Use of low-impact materials.
- Use of vehicles and means of transport with low impact (hybrids, electric, etc.)

Try to make all the transport efficient, from the supplier to the factory, and from this to the final customer

Within this strategy, the premise of attempting to compact should always be maintained, as far as possible. An intelligent design of the dimensions and shapes can save material and consumption during the trip.

Coffe Table (www.studioboca.it). Package and product in one. Source: ecoesmas.com

5.2.6. Strategy 5. Reduction in environmental impact of use

It is based on an approach to the future use of the product, as well as its maintenance.

Sub-strategies to be adopted based on the reduction of the consumptions caused by the use, as well as the own maintenance during the lifetime:

- Reduction of required maintenance.
- Opportunities to perform maintenance using with low-impact products/processes.
- Reduction of the consumption of the used energy necessary for the use of the product.
- Reduce the use of disposable consumables.
- Use of clean consumables.

.

Take into account whether the product has an impact during use (energy, noise, waste,…)

Solio Classic (www.solio.com).
Solar energy battery charger.
Source: ecoesmas.com

5.2.7. Strategy 6. Optimization of life-time

It is based on the fact that it should try to increase, as far as possible, the durability of a product (maintaining its functionality).

Sub-strategies to be adopted:

- Increased lifetime.
- High reliability and durability.
- Eas

Back to concept of "long-life product"

The concept "durability" means that an object is more environmentally friendly the longer its lifetime, because the longer it is, the longer it will pass until it has to be replaced. Obviously, this strategy advocates the use of durable materials and designs.

Tavolo Infinito (missdesign.it). Extensible, folding and unshakable table.
Source: ecoesmas.com

5.2.8. Strategy 7. Optimization of end-of-life

It is based on the reduction of the final impact of the product, once it has ended its lifetime and must be managed as waste.

The following recommendations could be used:

- ✓ Design and manufacture products which can be disassembled in minutes.
- ✓ Provided disassembly and separation instructions.
- ✓ Provide manuals for the management of the product as waste.

Sub-strategies to be adopted:

- Simplicity in the disassembly and separation of pieces (to better management).
- Ensure an easy and safe disposal.
- Recycling of materials/components used.
- Reuse of component.
- Energy recovery (wastes as energy source, …).

5.3. Successful cases[1]

5.3.1. Case 1: BSH KRAINEL, S.A.

Example of the use of strategies:

- Strategy 1. Use of low-impact materials
- Strategy 5. Reduction of the environmental impact in the use stage

Enterprise: BSH KRAINEL, S.A

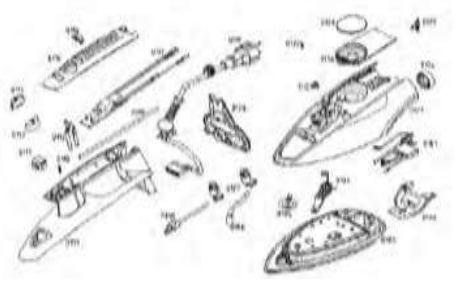
Case: *Incorporation of environmental criteria in the design of steam irons*

The iron family on which the working methodology was applied was TB66. For the TB66320 iron, the following objectives were set for improvement, each with its associated individual goals:

- Employment of low-impact materials.
- Reduction of the impact associated to the charging water glass.
- Reduction of the energy impact of the iron.

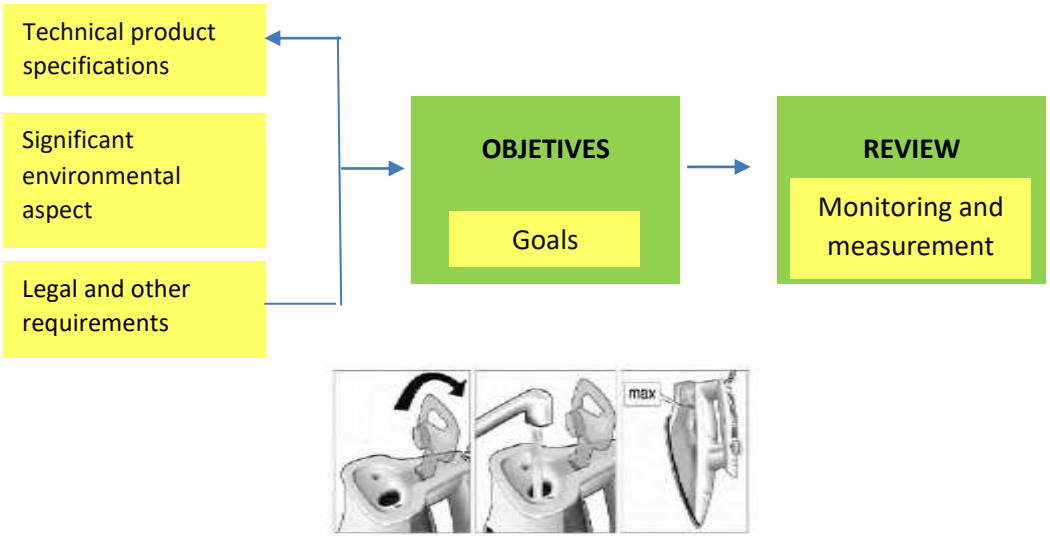
[1]Source: Ihobe. Public society of environmental management. "10 years of Ecodesign in the Basque Enterprise. 44 Ecodesign Practical Cases"

Iron image (TDA8318)



Exploded view of the iron TB66320

OUTLINE OF THE PROPOSED DESIGN PROCESS



Filling system of the model TB66230

Results of the project

The application of the improvement measures proposed to meet the targets set has resulted in an overall improvement in the environmental performance of the new TB66320 iron model manufactured by BSH KRAINEL, S.A. The main environmental improvements obtained were as follows:

- The substitution of the plastic material used in the cover, which is one of the components made of plastic with greater weight, by another one of less associated environmental impact which has allowed to reduce considerably the environmental impact of this component, as much for the lower impact associated to the material, as by the reduction of the final weight of the piece.
- The redesign of the product allowing the filling of water directly from the tap by the back of the iron, has allowed to completely eliminating the

load vessel, which has reduced the number of components to be manufactured.

- An automatic control system has been established, by means of an electronic control device, optimizing the power necessary for correct ironing. This has allowed reducing the main environmental aspect of the iron: the energy consumption during the use phase.

5.3.2. Case 2: BURDINOLA, S.COOP.

Example of using the strategies:

- Strategy 2. Reduction of materials.
- Strategy 3. Optimization of product techniques.
- Strategy 4. Optimization of distribution system.

Enterprise: Burdionla, S. COOP.

Case: *Application of Ecodesign methodology in the re-design of the gas hoodV21ST1500 Advance.*

The product on which the methodology of Ecodesign is applied was for the gas hood V21ST1500 Advance, where the main aspects identified were:

- Consumption of aluminium in the lateral profiles and service panels.
- Steel consumption in the structure that maintains the joint.
- Consumption of melamine for the lateral and superior closures.
- Transport of compact laminate panels for the interior lining of the hood from Central-Europe...

Initial design of the product Re-design performed

Results of the project

- Maximize the % of recycled material in the aluminium pieces. Increased supplier relationship for the supply of non-anodized profiles, reducing costs by around 12% by eliminating an unnecessary process.
- Redesign of the front cover and the frame to reduce the amount of aluminium and the number of pieces. The whole is composing by 10 elements.

  After the redesign, the amount of aluminium has been reduced by 56.1%. PVC lanes have been removed and the number of components reduced (from 10 to 4). After the re-design, it was possible to change the location of the sensor and remove vertical division, reducing by 12.5% the amount of aluminium used, as well as the number of components (from 17 to 9).
- Redesign of the lateral metal structure. It was decided to change the iron material by Ocumen boards with 15mm thick. The iron (53 kg) has thus been removed. The weight has been reduced and also certain production processes (welding, drilling, painting,…), facilitating the assembly too.
- Design of a packaging with recycled, recyclable and reusable materials. The company already used recyclable materials. Even so it was proposed

to make a reusable packaging in order to minimize waste at destination and at the same time recover the packaging for other occasions. It was also established that, for large orders of gas hoods, where there is a considerably go back and forth from trucks to factory, the hoots will be shipped unassembled in "moulds" that will be return to be able to use them again.