

Basic concepts on Ecodesign

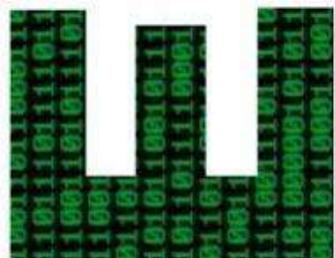
Unit 7: Implementing Ecodesign

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| | | |
|-------|---|----|
| 7.1 | Introduction to the methodology for the development of an Ecodesign project | 2 |
| 7.2 | Stage 1: Preparation of an Ecodesign Project | 2 |
| 7.2.1 | Stage 2: Work team..... | 3 |
| 7.2.2 | Selecting a product..... | 3 |
| 7.2.3 | Motivating factors | 3 |
| 7.3 | Stage 2: Environmental aspects | 4 |
| 7.4 | Stage 3: Ideas for Improvement..... | 6 |
| 7.5 | Stage 4: Development Concepts | 7 |
| 7.6 | Stage 5: Product in detail | 8 |
| 7.6.1 | Defining the product in detail | 8 |
| 7.7 | Action Plan | 9 |
| 7.8 | Stage 7: Evaluation | 10 |

With this unit, the student will be able to:

- Understand the general concepts of Ecodesign
- Know the benefits of Ecodesign in the social and economic concepts.



7.1 Introduction to the methodology for the development of an Ecodesign project

The environmental factor must be integrated if the companies want to follow the evolution of market, the legislation and the customer's own demand. That is, develop ecodesign throughout the life cycle, but knowing that it is present in all stages of the life of the product, from the supply of materials to the final disposal of the product.

The manufacturer must be aware that not only has control over the stage of production, but also over all others.

This unit presents the methodology of the 7 stages with which to develop an Ecodesign project.

| Stage | | Objective |
|-------|------------------------------|--|
| 1 | Project preparation | Selection of work team. Selecting a product. Factors |
| 2 | Environmental aspects | Throughout the product cycle |
| 3 | Ideas for improvement | Generation and prioritization |
| 4 | Development concepts | Conditions and alternatives |
| 5 | Product in detail | Definition |
| 6 | Action plan | For the remaining measures. Integration of strategy into design and management |
| 7 | Evaluation | In order to obtain findings about the project. Continuous improvement. |

7.2 Stage 1: Preparation of an Ecodesign Project.

| STAGE 1: PROJECT PREPARATION | | |
|------------------------------|-------------|---|
| | Objective | SELECTION - Work team - Selecting a product - Motivating Factors |
| | Departments | - Management - Product Development Coordinator - Other Departments |
| | Tools | - Product selection criteria - External motivating factors - Motivating internal factors |



7.2.1 Stage 2: Work team.

It will be responsible for the correct operation of the project.

For the selection of the work team it is recommended to follow the following aspects:

- **Organization and size:** not too many people for greater operational agility. There must be a coordinator.
- **Decision:** the work team is free to make decisions. The management must give freedom of choice to the work team.
- **Multidisciplinary:** having people from different departments will allow to collect all the information in first hand, as it must take into account all kind of aspects
- **Required departments:** in addition to being able to count on personnel from other departments, there are some of them that should be part of the team as a priority:
 - o Coordinator of product development department
 - o Manager
 - o Purchases
 - o Environment and quality
 - o Marketing
- Obviously, it can be of great interest for the development of the project, **to have external collaboration of experts in:**
 - o Environment
 - o Design / engineering

7.2.2 Selecting a product

There will be specific selection criteria for each company. Even then, usually some recommendations should be followed to identify the most appropriate product:

- Should be modified.
- Clearly affected by motivating factor.
- Make it relatively simple (at least in the first projects).

7.2.3 Motivating factors

Motivating factors for incorporating ecodesign in the design process are rooted in the analysis of context, both external and internal issues.

EXTERNAL MOTIVATING FACTORS

- **Administration: legislation and regulation:** the European Union is developing environmental policies that directly affect to the responsibility of the manufacturer. Furthermore, many countries are developing their own legislation as well.



- **Market:** the customer is increasingly sensitized. Many companies are increasingly requiring certifications (like ISO 14001) to its suppliers. Starting an ecodesign strategy over time can be very beneficial to the company, giving evidences that it has captured the customer's awareness.
- **Competitiveness:** the environmental component positively affects to the quality of a product. Furthermore, that means differentiation and leadership.
- **Social environment:** Ecodesign clearly improves the corporate image.
- **Others:** sectoral organizations, suppliers, technological innovations, etc.

INTERNAL MOTIVATING FACTORS

- **Product quality:** Ecodesign helps to improve the environmental product quality: functionality, reliability, durability, etc.
- **Image:** both the product itself and the company itself, communicate the improvements to the stakeholders.
- **Costs:** Ecodesign facilitates cost reduction, both immediately (weight reduction, new materials, improvement of process, transportation, consumption, etc.) how by environmental criteria to be implemented at all stages of the cycle.
- **Other:** innovation, corporate social responsibility, motivation, etc.

7.3 Stage 2: Environmental aspects

| STAGE 2: ENVIRONMENTAL ASPECTS | |
|--------------------------------|---|
| Objective | ANALYSIS OF ENVIRONMENTAL ASPECTS OF THE PRODUCT THROUGHOUT THE LIFE CYCLE |
| Departments / People | <ul style="list-style-type: none"> - Product development coordinator - Management - Other Departments - External expert |
| Tools | <ul style="list-style-type: none"> - MET Matrix - Indicators - Software life cycle analysis |

7.3.1 Product systems. Limits

It should be clear what aspects of the product that cause environmental impact are increased. To do this, not only the physical product is studied but, a vision of the product system as a whole is necessary. Mainly should study those external elements to product may be affected by changes in its design.



7.3.2 Environmental aspects. Identification.

Establish a procedure to identify environmental aspects and determine those aspects that have or can have a significant impact to the environment.

The definitions of the terms "Environmental aspect" and "environmental impact" are:

- **Environmental aspect** "organization's activities, products, and services affect the environment" (ISO 14001).
- **Environmental impact:** "Any change in the environment, resulting in whole or in part of the activities, products and services of an organization".

7.3.3 Methods of analysis

In order to analyze the environmental aspects and to establish in which of them one wants to intervene in the product design and development project, there are several methods:

MET Matrix: Qualitative method of inputs and outputs in each stage of the product life cycle.

MET abbreviations correspond to:

- **M** "materials" (consumption) in each stage of the lifecycle.
- **E** "energy" impact of processes and transportation in each stage life Cycle
- **T** "toxicity" referred to all outputs of emissions, discharges and toxic waste.

Eco-indicators: simple quantitative tool. More accurate than MET method. The prioritization is based on numerical calculations.

- Use: templates are available to fill in.

The product life-cycle management in the template is divided into three stages:

- Production
- Use
- Disposal

Life-cycle assessment software: There are many, the most prominent: Eco-it; EcoScan; Simapro, Idemat and GaBi Software.



7.4 Stage 3: Ideas for Improvement.

| STAGE 3: IDEAS FOR IMPROVEMENT | |
|--------------------------------|---|
| Objective | Create improvements ideas in the product |
| Departments / persons | <ul style="list-style-type: none"> - Design department - Management - Other Departments - External Expert |
| Tools | <ul style="list-style-type: none"> - Eight ecodesign strategies - Brainstorming - Matrix prioritization |

Once you know the main environmental aspects, the improvements ideas should be created. Throughout the process will come different ideas, which should be prioritized to work on the best. For this, there are some strategies.

7.4.1 Eight Ecodesign Strategies

The strategies are studied in Unit 5 of this course. Wheel of the eight strategies



The summary of the strategies is in the following table:

| Strategy | Measures |
|--|--|
| 0. Optimize The function: | <ul style="list-style-type: none"> - Product Sharing - Integration features - Functional optimizing product - Product substitution for a service |
| 1. Select low impact materials | Materials <ul style="list-style-type: none"> - Cleaner - Renewable - lower energy content - Recycled - Recyclable |
| 2. Reduce material usage | Reduction of: <ul style="list-style-type: none"> - Weight - Volume |
| 3. Select efficient environmental production techniques | <ul style="list-style-type: none"> - Alternative production techniques - Reduce production stages - Lower power consumption - Reduced waste production - Cleaner production Consumables |
| 4. Select environmentally efficient forms of distribution | <ul style="list-style-type: none"> - Less packaging/ cleaner / reusable - Energy-efficient transport |
| 5. Reduce the environmental impact in the use phase | <ul style="list-style-type: none"> - Lower energy consumption - Cleaner energy sources - Less need for consumables - Cleaner consumables |
| 6. Optimize the Life Cycle | <ul style="list-style-type: none"> - Purpose and durability - Maintenance and repair easier - Product structure - Classic design - Strong product-user relation |
| 7. Optimize end-of-life system | <ul style="list-style-type: none"> - Reuse of the product - Remanufacturing / modernization - Recycling of materials |

7.5 Stage 4: Development Concepts

| STAGE 4: DEVELOPMENT CONCEPTS | |
|-------------------------------|--|
| Objective | Development of conditions to get and possible alternatives |
| Departments / persons | <ul style="list-style-type: none"> - Design department - Quality department - Purchase department - Marketing department |
| Tools | <ul style="list-style-type: none"> - Creative techniques |



- **Selected tools by the company for the study of environmental aspects (eco-indicators, software tools)**

Once the ideas of environmental improvement and are generated and the most important ones selected, the development stage begins, which will lead to the new product.

The goal is to get solutions for the product that meet the solicitation documents.

7.5.1 Solicitation documents

It is established based on the results of the previous stages. It will have take into account all the specifications of the product: environmental, technical, ergonomic, commercial and economic.

7.5.2 Generation of new product concepts

The objective is to develop product concepts. This phase is to achieve a preliminary design by defining provisionally: composition, shape, materials, etc.

Several developments of conceptual solutions must be drawn in parallel in order to find the solution that fulfills the requirements of the specifications in a better way.

7.6 Stage 5: Product in detail

| STAGE 5: PRODUCT IN DETAIL | |
|----------------------------|--|
| Objective | Define the product in detail |
| Departments / persons | <ul style="list-style-type: none"> - Design Department - Quality Department - Purchasing Department - Marketing Department |
| Tools | - Selected tools by the company for the study of environmental aspects (eco-indicators, software tools) |

This stage aims the detailed definition of the selected concept for a final design. The process will be iterative, evolving from a definition stage to the level of detail.

7.6.1 Defining the product in detail

The result is a final design of almost ready for its manufacturing product.

Initially, the characteristics of the selected concept in stage four will be defined in depth.



The main decisions about shape and manufacturing will be taken. Then, the factors are determined: environmental, functionality, reliability, possibility of manufacture and costs. Layout diagrams will be obtained.

Subsequently it takes place defining the number of parts: shape, dimensions, tolerances, properties, materials, etc.

7.7 Action Plan

| STAGE 6: ACTION PLAN | |
|----------------------|---|
| Objective | <ul style="list-style-type: none"> - Establishing action plan for all measures of environmental improvement of the product in a medium and long term - Finally integrate Ecodesign in design and management tools at the company-wide level |
| Departments / people | <ul style="list-style-type: none"> - Design department - Rest of work team - Management |
| Tools | <ul style="list-style-type: none"> - Medium- and long-term product action plan - Alignment action plan with design procedures - Nesting action plan in the ISO 9001 - Nesting action plan in the ISO 14001 |

At this point of the project, it is necessary to establish an action plan at a product and company level.

7.7.1 Product action plan

After generating the environmental improvement measures in the previous stages, it will establish a plan of action that includes all the improvement measures selected and not yet implemented, with its term of implementation, actions to be carried out, personal responsible, etc.

7.7.2 Business Action Plan

After using the methodology and Ecodesign tools within the product development department, it will decide which of them is interesting for the company and how can be integrated into the process of designing new products.

Integration with ISO 9001: ISO 9001 standard offers the opportunity to hold the product-oriented environmental management in several processes involved with design and subsequent management for manufacturing or distribution.

Integration with ISO 14001: ISO 14001 assumes that companies know the environmental impact of their products. That is, the system extends to the control and



improvement of the environmental impact of the whole life cycle, not only taking into account the production processes, but everything else.

7.8 Stage 7: Evaluation

| STAGE 7: EVALUATION | |
|-----------------------|---|
| Objective | Evaluate the results of the project in order to draw conclusions to learn to transmit the environmental results periodically |
| Departments / persons | <ul style="list-style-type: none"> - Design Department - Human Resources Department - Marketing Department - Management |
| Tools | <ul style="list-style-type: none"> - Evaluation chart - Reference documentation about green marketing |

Evaluate the project to know in what way it has been fulfilled and improved.

The results of the evaluation will be very important to train, inform and motivate the rest of the staff, and to include green marketing in the marketing campaigns or strategies of the company, exercising a position of differentiation and leadership.

To evaluate the project there are some recommended criteria to follow:

- Assess the improvement of the main environmental aspects comparing the new product with the product at the beginning of the stages.
- Check compliance with the requirements of the solicitation documents.
- Analyze how the improvements affect to fulfillment of the motivating factors.
- Combine environmental improvements and compliance motivating factors, correctly informing the relevant target audience.

