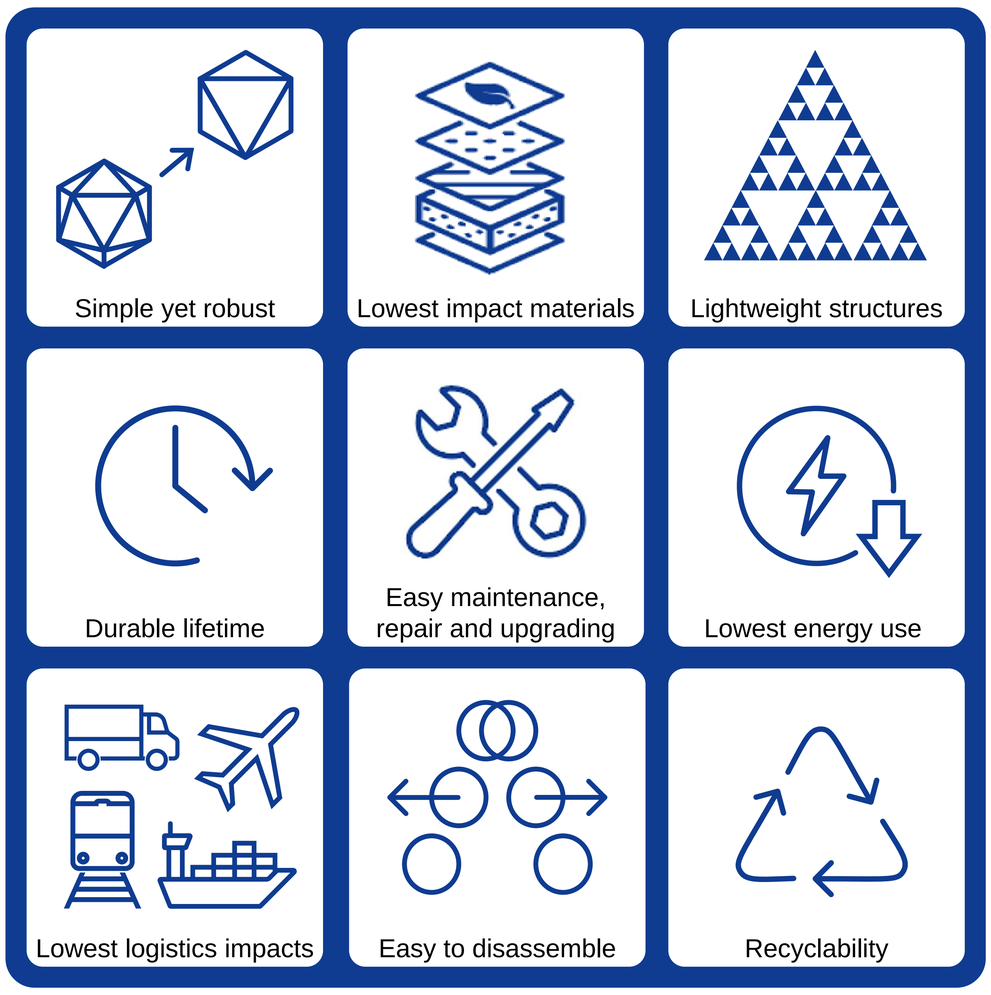
helbling

Ecodesign for Plastic Products



Using a systematic ecodesign approach that integrates tools such as LCA and MCI to calculate and analyze different environmental impacts is key to develop more sustainable products.

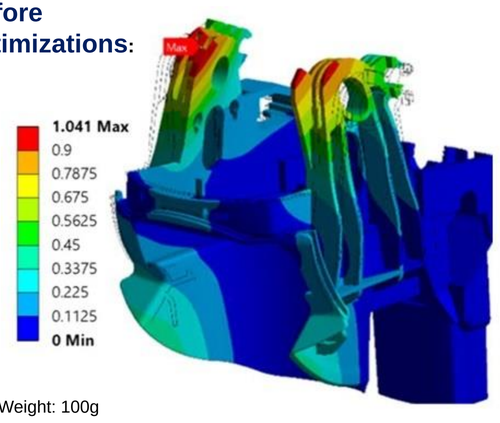
Various ecodesign principles (see figure on the right and examples below) can be very useful to find effective ways to minimize the environmental impact of the products in development.

Example 1 - Lightweight Structures

Topology optimization of a plastic part for a Nestlé coffee machine

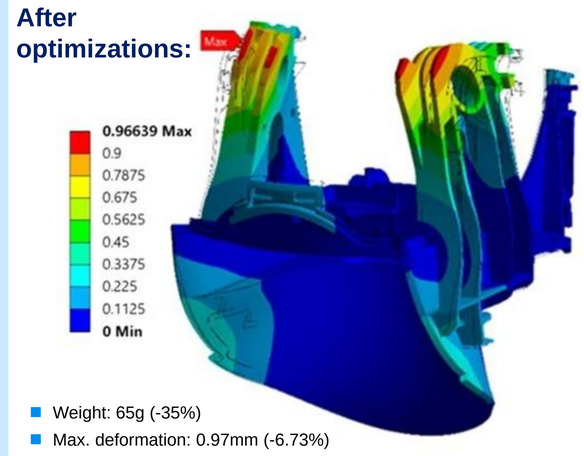
Depending on the type of plastic that is selected for a specific part, it is possible to optimize the structure / topology, so that amount of material is minimized while keeping the structure as strong as necessary to meet the requirements for static and dynamic loads. This is possible by using FEM (finite element method) tools to compute and analyze mechanical stress and deformation of the part.
The plastic part shown to the right was optimized for a Nestlé Dolce Gusto coffee machine. After the optimization, the part weight was reduced by ~35%.

Before optimizations:



- Weight: 100g
- Max. deformation: 1.04mm

After optimizations:



- Weight: 65g (-35%)
- Max. deformation: 0.97mm (-6.73%)

Example 2 - Recyclability

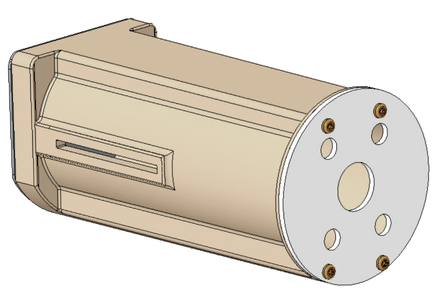
Design for easiest recycling

Complex components with many parts demand more design considerations. In this example, the component on the left was initially designed to fulfill the technical requirements such as a structure that will resist the static and dynamic loads, but the selected materials can not be recycled in standard WEEE streams. For this reason, the design were reworked for other materials that can come from secondary sources, and which can also be recycled at the end-of-life in the standard recycling streams.

Before optimizations:

High performance plastic (PA-GF)

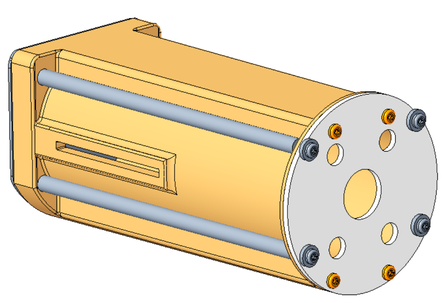
- Not recyclable
- Low recycled content
- GWP = 4.6 kg CO2eq



After optimizations:

Low performance plastic (ABS) + Steel, but structure fulfills only the necessary functions

- Recyclable
- High recycled content
- ↓CO2 GWP: 2.1 kgCO2eq (-54%)

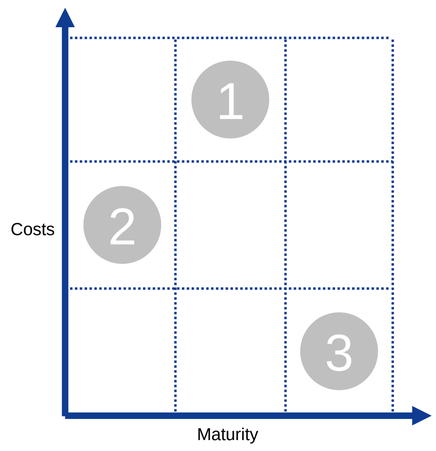


Example 3 - Lowest impact materials

Finding better alternative for food packaging materials

There is a vast number of materials which are available for food packaging products, and constantly there are new available materials, some of which offer better environmental performance than the currently implemented ones. In this project a framework was developed and applied to compare objectively the sustainability benefits of the different options as well as other key aspects for their adoptions.

Material selection possibilities:



Solution 1:
- Recyclable
- Recycled raw materials
- ↓CO2 Reduced carbon footprint

Solution 2:
- Renewable raw materials
- ↓CO2 Reduced carbon footprint

Solution 3:
- Renewable raw materials
- Compostable

Innovating a sustainable future.