Ecodesign Decision Boxes for Environmentally Sound Product Development

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***Abstract* —** *Industry projects show that Life Cycle Thinking and the idea of ECODESIGN are still not well established among engineers in product development. Available tools such as the ECODESIGN **P**roduct, **I**nvestigation, **L**earning and **O**ptimization **T**ool (PILOT) [Wimmer, Züst, Lee 2004] may help to implement ECODESIGN into product development considerations and to improve an already existing product. However, an application of those tools in the decisive early stages of the product development process remains difficult for design engineers.*

A systematic tool called 'Ecodesign Decision Boxes' was developed for integrating the concept of ECODESIGN into product development in order to help engineers to develop an environmentally sound product which has an optimised environmental performance [Ostad Ahmad Ghorabi 2005].

I. OBJECTIVE

According to [Luttropp 1999] around 30 aspects need to be addressed in the product development process. Some of these aspects are e.g. materials, reliability, quality or profit. The environmental aspect is also one of the aspects which have to be considered in product development.

The Ecodesign Decision Boxes where developed to give special attention to this part and aspect of the product development process and allow the implementation of environmental considerations into technical product designs and product development processes. Aim was to develop a tool that allows optimizing the entire product as well as tracking and controlling the influence on environmental aspects of a product along its life cycle phases. An overall evaluation of the environmental performance of the product design as well as a detailed view on the performance of each component, part and of each material used in the components should be assured.

II. METHOD

For the development of a first version of the tool product data from a multinational company producing office chairs were taken into account.

At first, life cycle data for the product obtained in a Life Cycle Assessment (LCA) according to the EDIP method [Wenzel, Hauschild, Alting 1997] have been gathered and further processed to suit an application in Ecodesign Decision Boxes. Before an optimization of the environmental performance of a product can be achieved, it is necessary to get an overview of the current environmental performance of the product through its life cycle phases. This is done in the first step of the tool. In this step graphs based on LCA data for the assembled product are generated and displayed in a so-called 'Design Box'. With the help of the Design Box those components contributing most to the environmental impact of the product can be tracked. In a second step LCA-based graphs for the most relevant components can be generated in 'Component Boxes' where the environmental performance of the considered component can be tracked more detailed for all its life cycle phases. The Component Box allows identifying the most relevant materials with respect to their environmental performance. In a third step LCA-based graphs are generated for each material used in the components in a 'Material Box'. The procedure of the application of the Decision Boxes is demonstrated in Figure 1.

A Material Box shows the aggregated environmental impact per weight of a given material over a typical life cycle based on LCA results for the type of product the material is used for.

A Material Box for the three materials PA66, ASt35 and PP is shown in Figure 2. The characterized impact for Global Warming (char. impact for GW) is drawn against the weight of the material.