

## **PARAMETRIC ECODESIGN – AN INTEGRATIVE APPROACH FOR IMPLEMENTING ECODESIGN INTO DECISIVE EARLY DESIGN STAGES**

H. Ostad-Ahmad-Ghorabi, N. Bey, W. Wimmer

*Keywords: Parametric Ecodesign, Design for Environment, Life Cycle Assessment (LCA), Product Families*

### **1. Introduction**

Experience from industry projects shows that accompanying companies during their product development process can effectively lead to the establishment of Life Cycle Thinking, green product concepts and environmentally sound products [Pamminger, Huber, Wimmer 2007]. Various tools, approaches and methods are already available which can assist product development engineers in tracking the environmental contribution of their products throughout their life cycle [Ostad-Ahmad-Ghorabi, Wimmer 2005, Lofthouse 2006]. Based on the evaluation of existing products which are already available on the market, these tools help to improve the product in further designs.

However, integrative approaches for implementing Ecodesign into the early decisive design stages usually confront designers and engineers in product development with a huge amount of data, numbers and facts. To be able to visualize life cycle assessment data and to ease their use in the early design stages, the Ecodesign Decision Boxes (EDB) were developed [Ostad-Ahmad-Ghorabi, Wimmer, Bey 2006]. This paper describes the further development of the methodological approach of the EDB which aims at gaining parametric reference models for environmental evaluation and for an effective implementation of Ecodesign into design stages, respectively.

### **2. Objective**

The methodology of Parametric Ecodesign incorporates proposing reference products systematically and will help using life cycle assessment data to optimize product designs and to implement Ecodesign strategies already in the early stages of product development. The parametric description of the reference product correlates technical and environmental data. This is done to track and influence the environmental contribution of each extracted parameter (e.g. type and amount of materials used, process technologies, surface treatment, etc...). At the same time a comparison of the resulting environmental impacts of a certain design with an appropriate reference of this product is facilitated. Just as with traditional product life cycle models, the parametric model allows tracking and comparing environmental impacts for the whole assembled product as well as for its sub-assemblies, components and parts.

Furthermore, due to the lower degree of detail regarding data (e.g. no specific materials but general material classes) the parametric model supports the designer in keeping an overview over all product life cycle stages and thus supports avoiding sub-optimisations in the form of environmental gains in one life stage potentially being overcompensated by environmental losses in another stage.