AN ECO-INFORMATION TOOL BASED UPON LIFE CYCLE THINKING

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Problems related to environmental impact of products and processes have become relevant. As shown by many Authors in the field, in spite of the high number of design tools developed and available in the literature, most of them are focused only on how to solve specific problems related, in particular, to the improvement of already existing products, and do not focus on design, belittling the link with Industrial Design approach. Authors developed an "eco-information tool", which can provide designers an easy to use eco-information system and allows them to choose the right strategies for the specific application, without disregarding customer needs, design requisites and standards/laws obligations.

THE ECODESIGN KNOWLEDGE SYSTEM - SUPPORTING ECODESIGN EDUCATION AS WELL AS ECODESIGN KNOWLEDGE MANAGEMENT

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The Ecodesign Knowledge System, presented in this paper, makes use of four strategies to support the efficient retrieval of information: a classification in a number of knowledge types, a contextual indexing technique, a web of knowledge, and direct access to term definitions. The Ecodesign Knowledge System received very positive reactions from designers during demonstration sessions. However, due to its high manpower requirement for system maintenance, it is as a knowledge management system mainly suited for large enterprises with centralised ecodesign competence centres. On the other hand, SMEs can take advantage of an externally supplied Ecodesign Knowledge System, serving mainly as an ecodesign education and technology watch tool.

ESTIMATING THE ENVIRONMENTAL IMPACTS OF SIMILAR PRODUCTS

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This paper proposes parametric estimation techniques as a simplified LCA technique for estimating the environmental impacts of a range of similar products based on a limited number of LCA studies. The aim of these environmental parametric estimation techniques is to establish a coupling between functional requirements (FR), respectively design parameters (DP) that product developers have at hand in early design phases and the environmental impact (EI) of the product. Three approaches, developed at two universities, are compared: theoretical modelling, Environmental Impact Growth Laws (EIGLs), and Eco-Cost Estimating Relationships (E-CERs). Strengths and weaknesses of the approaches are discussed.

EFFECTIVE AND EFFICIENT APPLICATION OF ECO-QFD

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In this paper, the QFD and its process will be systematically analyzed. In a first step the process is analyzed using elementary activities to identify e.g. superfluous, ineffective or mandatory activities. This analysis is visualized, similar to the functional structure of a product, in a structure of black-box representations. In this structure all activities, their arrangement, as well as their relation can be seen. Additionally a modified FMEA (Problem Mode and Effect Analyze) is applied to identify problems which might occur during the method use. The results of those methods are used to identify improvement options of QFD and to increase its effectiveness and efficiency.

SIMULATION OF PRODUCTS LIFE CYCLE: METHODOLOGICAL BASIS AND ANALYSIS MODELS

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The aim of this work consists of developing a methodological basis and the models for analysis, to allow the simulation of products life cycle at the design stage. The direct link between design choices and life cycle performances is achieved using a model of the product, which allows to simulate its behavior in relation to phenomena of materials deterioration. Applying the simulation method, it’s possible to associate each set of design choices under examination with a broad spectrum of information: durability and criticality of components and the system; possible faults and the consequent servicing costs; residual life of components and their possible reuse at the end of life; environmental impact of the whole life cycle.

ADVANCES IN HUMAN-POWERED ENERGY SYSTEMS IN CONSUMER PRODUCTS

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Research at Delft University of Technology into the use of human-powered energy systems focusses on multiple aspects of this technology. The paper describes a case study into the volumetric features of human-powered energy systems in portable radios, compared to batteries. We found large differences in specific energy and energy density between human-powered systems and batteries.

DESIGN FOR UTILITY, SUSTAINABILITY AND SOCIETAL VIRTUES: DEVELOPING PRODUCT SERVICE SYSTEMS

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This paper focuses on Product Service System (PSS) development as a promising approach for sustainable product development. We attempt here to identify the nature of such a multiple definition of PSS, the link to proper understanding of value & utility and innovative approaches for PSS development. We expand on the phenomenon of PSS, in the belief that a proper understanding will give us the design degrees of freedom necessary to create radical innovation. We draw upon existing product development and PSS theory & models and experiences from projects carried out with both industrialists and students. We demonstrate a series of important arguments in the paper that support PSS consideration in industry.

THE ECO-VALUE ANALYSIS – AN APPROACH TO ASSIGNING ENVIRONMENTAL IMPACTS AND COSTS TO CUSTOMERS' DEMANDS

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Design for environment faces a conflict: On the one hand, products must be environmentally friendly; on the other, products must conform with the market. The customer does not buy components; s/he buys functions. Measures that improve the products' market value often lead to increased environmental impacts and costs, since every product function causes some. The developed Eco-Value Analysis supports the designer to fulfil customers' demands and aims at a holistic approach, considering technical, environmental and economical aspects. Two portfolios represent the results. Dependent on the results for each function, recommendations for designing products, which are environmentally friendly as well as conform with the market are given.

ECO DESIGN: MAKE IT HAPPEN BY AN ENVIRONMENTAL INNOVATIVE PRODUCT DESIGN

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The classical way of performing eco design – take a product, perform a weak point analysis (i.e. an LCA) and redesign the existing products focusing the found weak points – results in a small change in design by an investment of a huge time effort to perform the LCA and neglecting essential procedural needs to find complex problem solutions. The approach of an Environmental Innovative Product Design (EIPD) allows also the improvement of products which seem to be squeezed out, based on a Design for Environment approach. The developing and realizing a prototype of a vacuum cleaner shows, that the philosophy and the suggested approach is powerful enough for innovation and for improvements even in the field of well developed products.

THE WAY TO DO ECODESIGN IN COMPANIES - INSTALLING A CONTINUOUS IMPROVEMENT PROCESS

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A multinational company producing office furniture requested an appropriate tool to integrate "environment" into their product development. This lead to the company adaptation of the ECODESIGN Product, Investigation, Learning and Optimization Tool and initiated a continuous improvement process for integrating sustainability into every-day practice. The corner elements of the initiated process are analyse, improve, communicate, and educate. Based on a LCA according to ISO 14040 products were improved with the PILOT and the environmental performance was communicated to the market using ISO TR 14025. Additionally an e-learning course was implemented to train staff, and distribute environmental knowledge within the company.