

**Miriám PEKARČÍKOVÁ**

## **PRODUCT DESIGN FOR DISASSEMBLY**

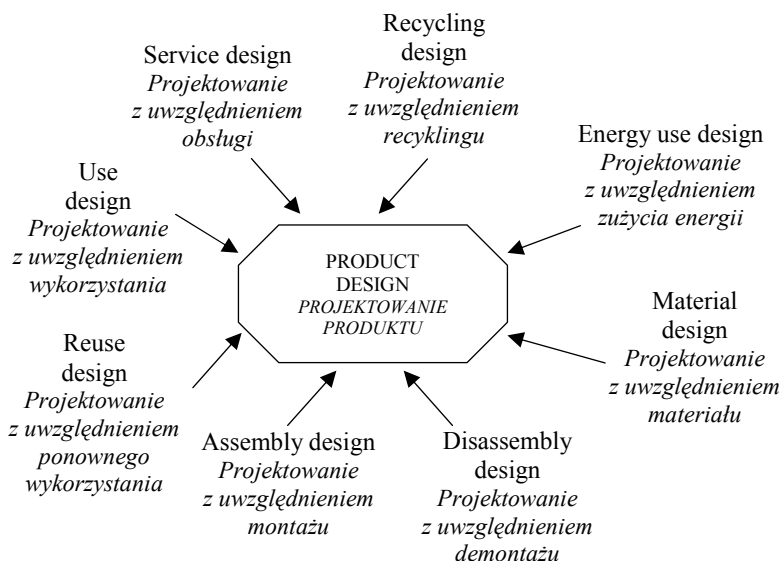
*Product design solutions is a complex decision about design and development that are directed at production of product which would be the best combination of options that will lead to manufacture of product that is technologically sound, environmentally friendly, economically rational, and socially acceptable. This material was prepared within project KEGA 3/5208/07 "Virtual laboratory for designing the disassembly systems of eliminated products" carried out in Slovakia.*

**Keywords:** design, disassembly, environment, product

### **Introduction**

The product design represents a complex which should be considered in a broader context. Issues to be pondered deal not only with product design in terms of product's appearance, but with the whole concept of product making consisting of:

- concept of product solutions taking into account environmental requirements,
- choice of materials,
- geometry of the product,
- dimensions and placement of product components,
- product technology in terms of assembly/disassembly.



**Fig. 1. Product design as a complex**  
*Rys. 1. Projektowanie produktu jako kompleks*

## The concept of product solutions taking into account environmental requirements

Within this characteristic is necessary to answer the question: How to translate customer requirements and needs into the product and at the same time keep to principles of low consumption of energy and resources, and production of minimum of waste?

At this stage it is important to think of product survival, i.e. consider the efficiency of recovery of various parts of the product when its life cycle ends, i.e. whether it is better to turn post-consumer materials into secondary raw materials or reuse undamaged components and parts in new products or as spare parts.

On the one hand, product design in the context of energy design should ensure low power consumption and, on the other hand, long life of the product.

## The choice of materials from the recycling perspective

- Already in product design it is necessary to think about product recovery at the end of the life cycle, i.e. to consider the following:
- reduce the number and variability of materials used in the product, for example use the same plastic polymers,

- use of materials depending on the material stock to achieve sustainable use of natural resources and ensure a healthy environment,
- carefully select materials to exclude materials that are not environmentally friendly, and focus on production of parts that are easy to recycle,
- indicate materials used in individual parts that makes the classification for subsequent recycling easier, and also facilitates the use of recycled materials in any case as well as compliance with quality criteria,
- indicate the part of the product which must be cleaned, specially maintained to extend the life of the product etc.

### **Dimensions and placement of product components**

Dimensions of individual components constituting the product influence the quality and speed dismantling process. The aim is to reduce the amount of labour and number of tools engaged in dismantling to the minimum.

This can be achieved for example by using the same type and size of screws in the entire product, placing parts that are likely to wear out at the same time, near each other, so they can be easily replaced at the same time, or using a bind to simplify disassembly of individual components for servicing and recycling (screw, bind, click bind, soldering and welding bind etc.).

### **Product technology in terms of assembly/disassembly**

Optimal disassembly process is the one that ensures removal of the product (or obtainment of required components) at the lowest cost possible, as quickly as possible, using the least amount of labour, the smallest number of operations, and the smallest number of tools and devices.

Basic criteria for selection of optimal dismantling procedures are the following:

- productivity – the amount of dismantled products per unit of time or labour,
- quantity of processed waste,
- number of operations,
- layout of workplaces – depending on the type and quantity of products,
- degree of automation – depending on the type and quantity of products,
- equipment of workplaces with modern technologies,
- equipment of workstations with tools and devices,
- ergonomics,
- energy intensity,
- economic criteria - the efficiency of recycling (energy and material consumption), the effectiveness of repairs (the price of a new product versus the price of spare parts and labour costs associated with servicing).

Looking for the optimal process of product dismantling it is necessary to fulfil the aforementioned parameters.

## **Conclusions**

The efforts of producers should focus on creation of product that is the best combination of options that will lead to manufacture of product which is technologically sound, environmentally friendly, economically rational, and socially acceptable.

The product solutions may incorporate requirements connected with inclusion of environmental parameters of products, product design allowing for dismantling necessary for servicing and disassembly necessary for recycling.

## **PROJEKTOWANIE PRODUKTU Z PUNKTU WIDZENIA DEMONTAŻU**

### **Streszczenie**

Niniejsze opracowanie pokrótce informuje o rozwiązaniach w sferze projektowania, rozumianego jako skomplikowana decyzja ukierunkowana na wybór optymalnego wariantu. Prowadzi to do wytworzenia produktu solidnego z punktu widzenia technologii, ekologicznego, ekonomicznie racjonalnego i akceptowanego społecznie.

**Słowa kluczowe:** projektowanie, demontaż, środowisko, produkt

Ewa TOMASZEWSKA

## SKOMPUTERYZOWANE CENTRA INFORMACJI W SZWAJCARII

*We wrześniu bieżącego roku odbyło się seminarium szkoleniowe dla pracowników informacji i bibliotekarzy, którego celem było zapoznanie uczestników z organizacją i funkcjonowaniem centrów informacyjnych i multimedialnych oraz strukturami bibliotek w Szwajcarii.*

**Słowa kluczowe:** informacja naukowa, biblioteka, zbiory biblioteczne, komputeryzacja, centra multimedialne, współpraca międzynarodowa, Szwajcaria

W dniach 19–26 września 2009 roku odbyło się w Genewie, Lozannie i Bernie seminarium szkoleniowe zorganizowane przez Unię Europejskich Federalistów – Polska pt.: „Skomputeryzowane biblioteki, centra informacyjne i multimedialne Szwajcarii.”

W seminarium uczestniczyły 44 osoby. Wśród uczestników byli pracownicy informacji naukowej i bibliotekarze wyższych uczelni (np.: Uniwersytetu Jagiellońskiego, Uniwersytetu Wrocławskiego, Uniwersytetu Warszawskiego), Biblioteki Narodowej w Warszawie i Paryżu oraz ośrodków badawczo-rozwojowych. Instytut Technologii Drewna w Poznaniu reprezentowała Ewa Tomaszewska, kustosz Zakładu Informacji i Promocji.

W ciągu czterech dni uczestnicy szkolenia zapoznali się z organizacją pracy narodowego systemu bibliotek w Szwajcarii, z działaniem centrów informacyjnych i multimedialnych oraz różnego typu bibliotek. Seminarium obejmowało wykłady i wizyty w bibliotekach takich jak Biblioteka Genewska (*Bibliothèque de Genève*), Biblioteka Kantonalna i Uniwersytecka w Lozannie (*Bibliothèque cantonale et universitaire*), Biblioteka Narodowa w Bernie (*Bibliothèque nationale suisse*), czy Wyższa Szkoła Zarządzania – Centrum Informacji i Dokumentacji (*Haute école de gestion – Information et documentation*). Podczas seminarium przedstawiono nowoczesne technologie informacyjne i związane z nimi