

## **Multifunctional elements for energy efficient jewelry design**

The society is now characterised by profound economic and social changes, based on new technologies usage in all spheres of human activity [1]. This problem concerns almost every branch of production, so for a partial solution of this problem is to improve energy efficiency. We suggest to study the steps of creating conceptual design, modeling and process design to reflect on some of the elements of multifunctional products. This solution also minimizes wastes to optimize the production of a limited set of standardized parts, which obtains a combination of an unlimited number of products [2].

In this paper, we set the problem of products cut from sheet metal by a laser cutting machine. The aim of this work is to combine the ecological, aesthetic and economic elements into design while not forgetting the functionality of the final product.

We set the following objectives:

1. Search for a multifunctional flat shape.
2. Development and modeling of a universal, functional, simple resource-element, which may be scaled to change its functionality without infringing its ease of production.
3. Mapping the sheet cutting to produce the element in bulk
4. Selection of the optimal material.
5. Simulation and products based on a base element, including use of cutting wastes.
6. Manufacturing of products.

The main difficulty is to find the form of the element that gives us the maximum variance in application. The most suitable materials for the creation of such elements are sheet materials. In our case we take jewelry that consist of a small number of different components, they have an aesthetic design and practical usage, the wastes from the production are minimized. These requirements are to select simple products, that may be easily linked into elementary shapes that fit within the boundaries of the sheet material. As a design tool a complex CAD is used. These products are designed with the most suitable program SolidWorks, because it ensures product development of any complexity [3].

During the development of this project few simple forms suitable for different combinations and suitable to a variant of jewelry are presented. With the help of this form optional set of jewelry were designed in the SolidWorks software. As a material for manufacturing the product a 3 mm thick plywood was selected. The layers of sheet are bonded by pins that are pressed into the holes. Thus, it is not energy consuming and everything is kept securely without gluing or soldering.

This approach allows manufacture of products from the cut sheet applies not only to jewelry, but also, for example, to the manufacture of furniture.

Undoubtedly, the development of multi-elements, which are designed not only to minimize costs, the requirements maintaining the aesthetics and ecology have a positive impact on productivity of an enterprise.

Summing up the work done, we note that in terms of technology this theme is profitable for the further developments.

### **References**

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