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INDIVIDUALIZED FINE INTERIOR EQUIPMENT - ELECTRICAL OUTLET AND SWITCH(A STAR IS BORN)

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Abstract: *Nowadays, mass production is losing its importance and market started to offer individualized products, e. g. products that are adjusted to users. Paper work shows the procedure and method of manufacturing individualized custom made switches and outlets to fill the gap in the interior design market. The idea is based on the principle of individualization, so that every switch and outlet responds to its users' demands. The analysis of the questionnaire at the end of the paper work shows a great market potential for custom made interior equipment.*
Key words: *Additive Technologies, Innovations, Individualized products, Rapid Manufacturing*

1. INTRODUCTION

Nowadays, we practically face an overflow of standard non-individual products. That leads us to a point where we start to think about individualized custom-fit products, which would correspond exactly to a specific user's demands and wishes bringing an added value to a product. Introduction of Additive Manufacturing technologies has increased the possibilities for faster and much more cost-efficient production of customized products compared to conventional manufacturing technologies (Pahole et al., 2005).
Because awareness that custom made products could be interesting for market, we decided, to design a sample product which would correspond to users wishes, be custom made and present the sense of uniqueness. For this purpose we also made a research about potential customer response, which shows the possibilities of customized products (Drstvensek, 2004).

2. PROCEDURE

To find a product which could be mass customized and still be actually unique for each customer is very difficult. Such a product should be an object of mass consumption but still its customization should bring enough added value. It is necessary to be innovative and creative and not to be limited by existing sets of ideas (Rogers, 1995). So we decided to offer a possibility of unique decorative covers of switches and outlets, which are presenting daily products of wide consumption, therefore a product that everybody knows and also uses. It is important to emphasize, that our way of customization doesn't change basic function of the product. Primary goal of making customized decorative covers of switches and outlets is actually a unique shape of product. This shape, which presents a certain synergy between internal place of a house, apartment or business place bring a certain added value to our market (Förster et al, 2006).

3. CAD MODELLING OPTIONS

The most important step during process of product customization is receiving information from a costumer in order to customize a product according to his wishes (Pahole et al.,2005). If we want to use Additive Manufacturing technologies in customized production than this information would ideally be in form of a finished customized CAD model. In case of our product we have several options of getting a CAD model for an individual customer. The first option is that we as a manufacturer would also do a CAD modelling. We would model according to customer's wishes which would be described orally, by a simple sketch or similar method. The second option would be to get CAD models from interior designers. In this case we would be just manufacturers. We expect that interior designers will be able to design their covers with help of our template with CAD software that they already use in their work. The third option is that we would prepare a web based simple CAD user interface. In this case every customer would model his own product (Figure 1).

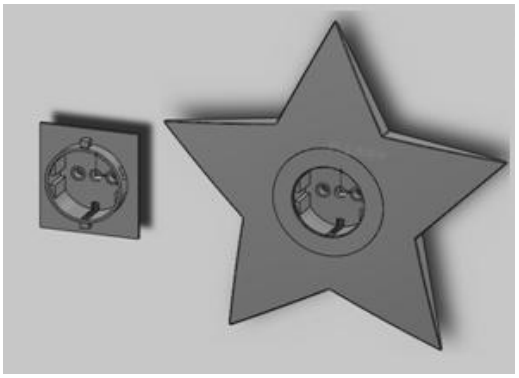

Fig. 1. Custom CAD modelling

4. PRODUCTION – SELECTIVE LASER SINTERING

SLS process has some advantages ahead of other RP processes such as a wide range of available materials. Available are polymers (nylon with various fibres, polystyrene), metals (steel, Ti) and some ceramics. The parts are functional and no support material is needed. With SLS we combine small material parts – powder with a high-power CO2 laser into layers, that combine to present 3D parts (Rapiman 2010).

The basic material is a powder with particles of diameter around 50 µm. The machine puts a thin layer of material on the working table, where a computer-controlled laser describes the contour of a part, so one layer of a part is built. Before the next passage, the working table is lowered by one layer, the next layer of raw material is placed on it and the procedure repeats itself. Example of a customized switch and outlet were made on EOS Formiga P100 selective laser sintering machine in the Intelligent Manufacturing Systems Laboratory of the Faculty of Mechanical Engineering, University of Maribor.

The Formiga P 100 represents laser-sintering in the compact class. With a build envelope of 200 mm x 250 mm x 330 mm, the Formiga P 100 produces plastic products from polyamide or

polystyrene within a few hours and directly from CAD data. The machine is ideally suited for the economic production of small series and individualised products with complex geometry – requirements which apply among others to the medical device industry as well as for high-value consumer goods(EOS, 2010). Both products were installed for testing and taking pictures that would later be included in the potential customer survey (Figure 2).

Fig. 2.Outlet and switch in working position

5. RESULTS

Survey was made through internet and with personal contacts. Important criteria were sex, age and education, opinion about decorative covers and about decision whether they are ready for buying custom made switches and outlets. Results show interesting aspects about age and degree of education of those that found the product attractive (Figure 3 and 4).

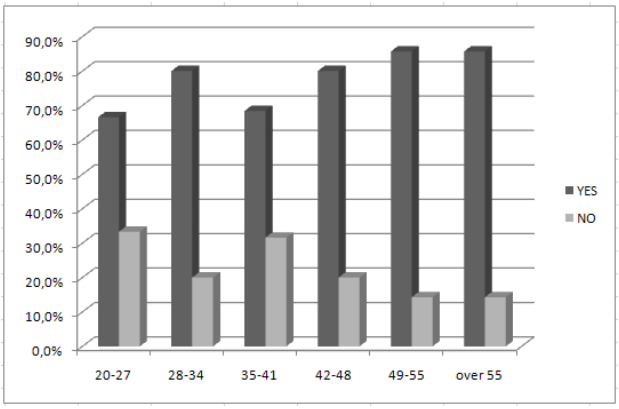

Fig. 3.Correlation Age - Attraction of custom made switches and outlets

Population, between 49 and 55 years old with secondary school education is the first target group. The second group is between 35 and 41 years old with college education.

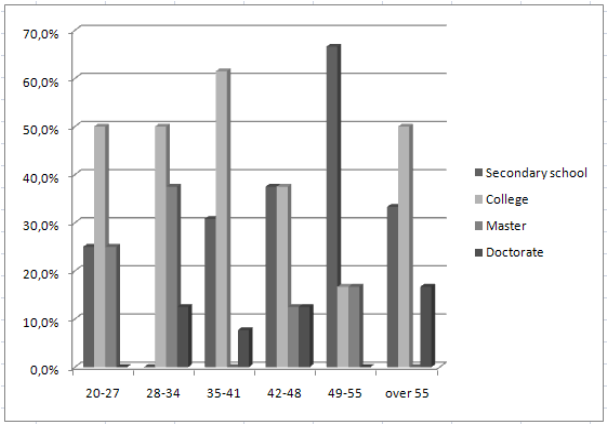

Fig. 4.Correlation between Education and Attraction of custom made switches and outlets

I think that this is because population in both target groups are accommodated in apartments or houses. This fact makes them interested for interior equipment. Both of target group had common opinion, that sale price should not be over 20 Euros for a piece. This is an important fact, because as far I know this price is hard to achieve with current prices additive manufacturing technologies that meet required mechanical properties and dimensional accuracy.

6. CONCLUSION

The presented case study shows the enormous potential of using Additive Manufacturing technologies in mass customization of products. Until now, individually customized products were made in fields of very high added values and complex geometry such as medical implants, custom hearing aids and aircraft parts. With ever greater availability and lower prices of Additive Manufacturing technologies, even much simpler products could be customized. Even in our case of a very simple and mass produced an individualized shape with retained basic product functionality could present enough added value to the potential customer.

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