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Praca doktorska

**Metoda wspomagania projektowania naczyń
szklanych z zastosowaniem konfiguratora
w środowisku poszerzonej rzeczywistości**

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The method of aiding the design process of glass containers with the use of configurator and augmented reality

Summary

The work is an attempt a new approach to solving a problem of aiding the desing process of glass containers.

Bearing in mind the current state of knowledge, the research problem was formulaited and the aim of the dissertation was defined, which was to develop a new effective method of supporting the design process of glass containers with the participation of a user who is neither a designer nor a constructor, moreover elaboration a system using a configurator and based on augmented realilty (AR) techniques, that would allow the practical implementation of this method.

Modern techniques of augmented reality make it possible to combine the real world with the virtual one in real time and in a three-dimensional environment, which opens completely new opportunities to run a design process in the real world, i.e. in the surrounding of existing products or in the target context in which the designed product will be presented (e.g. in storefront).

Techniques used in product configurators enable automation of certain operations by creating a set of rules defining ways, according to which various components can be combined with each other. So it means that when using a configurator, there is a possibility of dynamically adapting elements from the existing resource to the requirement of a broad group of clients, without the need to carry out project activities.

On the basis of the aforementioned, a hypothesis was made that it is possible to develop a mobile configurator of glass containers using software integration of augmented reality methods and CAx class parametric systems.

The second hypothesis has also been formulated, that due to the visualization of the container 3D model in its natural environment, the use of a configurator implemented on a mobile device contributes to an increase in the effectiveness of modeling.

The third thesis was also formulated that due to the specially developed interface of the configurator, the active participation of the user who ordered the new glass container is possible.

To prove the correctness of the hypothesis, the AR system with implemented methods was elaborated. The results proved the correctness of the formulated hypothesis.

Results of research confirm particular advantages derived from the method using AR techniques for aiding the design process of glass containers. Moreover, the elaborated method can help to shorten product development time.

Keywords: computer-aided design, product configurator, augmented reality, CAx class system