

Two-stage product design selection by using PROMETHEE and Taguchi method: A case study

Crnjac, M.^{a,*}, Aljinovic, A.^a, Gjeldum, N.^a, Mladineo, M.^a

^aUniversity of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, Split, Croatia

ABSTRACT

The main goal of this paper was to introduce the methodology for product design selection. The proposed methodology combines two classical methods to find the most appropriate design for the new product, through a reduced number of alternatives (product variants) and experiments for the selection process. In the first stage, the multi-criteria decision-making method, PROMETHEE was used for selecting the most suitable design, according to the chosen preferences and criteria. In the second stage, the Taguchi method was used in order to define the most appropriate parameters for selected suitable design. The fundamental scientific contribution of this paper refers to a benefit introduced by combining these methods. This benefit is related to the reduction of product development time which has a significant effect on manufacturing process time due to the high market pressure. The proposed methodology was applied to find the appropriate table design for CNC milling machine located in the Lean Learning factory. However, this is just one case study to present the proposed methodology which can be applied for other optimization of other product designs. Before applying the proposed methodology for this case study, the methodology is validated on a simple example.

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*Corresponding author:

mcrnjac@fesb.hr
(Crnjac, M.)

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Dvostopenjska izbira oblikovanja izdelkov z uporabo metod PROMETHEE in Taguchi: Študija primera

Crnjac, M.^{a,*}, Aljinovic, A.^a, Gjeldum, N.^a, Mladineo, M.^a

^aUniversity of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, Split, Croatia

POVZETEK

Glavni cilj tega prispevka je predstaviti metodologijo izbire oblikovanja izdelkov. Predlagana metodologija združuje dve klasični metodi, ki omogočata poiskati najustreznejšo zasnovo novega izdelka, z zmanjšanim številom alternativ (različic izdelka) in eksperimentov za izbirni postopek. V prvi fazi je bila za izbiro najprimernejše zasnove v skladu z izbranimi željami in merili uporabljena večkriterijska metoda odločanja, PROMETHEE. V drugi fazi je bila za določitev najprimernejših parametrov za izbrano zasnovo uporabljena metoda Taguchi. Temeljni znanstveni prispevek tega prispevka se nanaša na korist, ki jo uvaja kombinacija obeh metod. Ta korist je povezana s skrajšanjem časa razvoja izdelka, ki zaradi velikega tržnega pritiska pomembno vpliva na čas izdelave. Predlagana metodologija je bila uporabljena za iskanje ustrezne zasnove mize za CNC rezkalne stroje, ki se nahajajo v vitki didaktični tovarni. Vendar je to le ena študija primera, ki predstavlja predlagano metodologijo, ki jo je mogoče uporabiti tudi za optimizacije drugih modelov izdelkov. Pred uporabo predlagane metodologije za to študijo primera je metodologija potrjena na preprostem primeru.

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PODATKI O ČLANKU

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**Kontaktna oseba:*

mcrnjac@fesb.hr
(Crnjac, M.)

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