Conceptual design of the cross-arm for the application in the transmission towers by using TRIZ–morphological chart–ANP methods

ABSTRACT

This paper introduces the conceptual design of the wooden cross-arm of transmission towers using the application of the Theory of Inventive Problem Solving (TRIZ), the morphological chart and the Analytical Network Process (ANP) methods. The main objective of this study is to develop and choose the optimal conceptual design of the component according to the requirements of the product design, with a particular focus on including wood in the design of the component. During early solution generation, the TRIZ contradiction matrix and 40 instruments were used for the solution of inventive principles. By using morphological diagrams, the key solution parameters for specific design features was refined to establish theoretical concepts systematically for the elements. Four design principles of the innovative element were developed and ANP finally used for carrying out a multi-criteria decision-making process to select the best design for the wooden cross-arm of transmission tower. A second conceptual design was chosen as the optimum design for the suggested designs based on the results.

Keyword: Conceptual design; Balau wood; ANPTRIZ concept; Cross-arm