An aggregation technique for optimal decision-making in materials selection

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ABSTRACT
Materials selection is an onerous but very important activity in the design process. An inappropriate choice of material(s) can adversely affect the productivity and profitability and hence reputation of a manufacturing organization. The complexity of materials selection makes multi-criteria analysis an invaluable tool in the engineering design process. However, the application of various multi-criteria decision making (MCDM) methods can yield different results, especially when alternatives lead to similar performance. Therefore, an aggregation technique is proposed in this paper for optimal decision-making. In this approach, ranking orders obtained by various MCDM methods are used as the input of the suggested procedure and the outputs are aggregation rankings, which help designers and engineers to reach a consensus on materials selection for a specific application. An illustrative example is given to demonstrate the application of this procedure and its effectiveness in obtaining optimal materials selection.

KEYWORDS:
H. Selection of materials; H. Weighting and ranking factors; H. Performance indices

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