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Development of a sustainability risk assessment index of a mechanical system at conceptual design stage

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ABSTRACT

The increasing environmental concerns owing to the use of various engineering gadgets worldwide have posed a greater challenge for product designers, manufacturers, risk analysts and environmentalists in the design and development of various systems. In a system design environment, where sustainability risk assessment is the focus of the designer, the systematic consideration of sustainability risk during the conceptual design stage is a function of environmental impact of a system. This research paper presents a framework for sustainability risk assessment of a mechanical system at conceptual design stage. The system parameters are identified. These parameters are referred as Sustainability Risk Assessment parameters. Based on the parameters identified, the relationships among these parameters are also identified. These relationships are represented by means of a sustainability risk assessment graph. To avoid complexity of the graph while analyzing the system, it is represented by a matrix, which helps in developing the sustainability risk assessment expression. For analytical assessment, permanent risk function is obtained. Finally, an index is developed for evaluating various mechanical design systems from risk consideration. This framework will help designers while developing mechanical systems at conceptual design stage considering risk through sustainability. The proposed approach has been applied

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