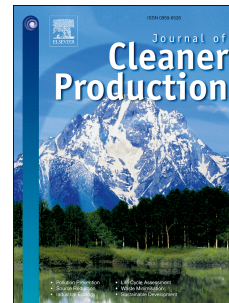


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Wiring in the automobile industry: Life cycle assessment of an innovative cable solution

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Abstract

The automobile industry is demanding new car components to reduce vehicle emissions and increase efficiency. Lightweighting strategies are the most followed by manufacturers to reduce the weight and fuel consumption of vehicles. In this study, an innovative signal cable solution for the wire harnesses of vehicle is analysed through a life cycle assessment (LCA) and benchmarked with the replaced cable. The innovative cable is made up of a copper-tin alloy, while the traditional cable is made of copper. Both products are twisted and insulated with plasticised polyvinyl chloride. The new cable reduces the weight and volume by 53% and 41%, respectively, compared to the traditional cable. The production of raw and ancillary materials was found to be the main impact contributor, mainly due to the production of the conductive and insulation materials. Similarly, electricity consumption was the main impact carrier for the manufacturing stage. The environmental burdens obtained for the innovative cable were, on average, 54% lower than those obtained for the replaced one. Additionally, the potential marginal gains for the automobile industry were evaluated in terms of fuel consumption reduction, which is linked to vehicle weight, and the derived emissions, obtaining a significant exhaust emission reduction of 160 kg CO₂ eq when compared to the baseline scenario. Finally, the LCA of these products was decisively influenced by the consumption of raw materials and, therefore, the reduction of the thickness of the wire makes the cables considerably more sustainable from an environmental point of view.

Keywords: LCA; eco-design; cable; wire harness; lightweighting; automobile

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