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Applications of Design of Experiments and Machine Learning in Product Innovation

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This work consists in a collection of useful results on the topics of Design of Experiments and Machine Learning applied in the context of product innovation. In many industries the performance of the final product depends upon some objective indicators that can be measured and that define the quality of the product itself. Some examples are mechanical properties in metallurgy or adhesive strength for glue products. In such cases, data is typically scarce and expensive experimentation is needed. Machine learning models can then be applied for the prediction of the quantity of interest. A literature review has been conducted, and the papers retrieved from the search have been carefully analysed: the main trends have been identified in terms of industry, type of application, experimental designs, and machine learning models adopted. Literature gaps and research opportunities have also been acknowledged. Driven by the results of the literature analysis, a simulation study has been conducted to empirically test what designs and algorithms appear more suitable based on a set of test functions found in the literature for the emulation of physical processes.

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