Materials selection tools in professional appliances: hypothesis to estimate materials' performance and impact on industrial processes

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Concept

The use of materials' selection in professional appliances increased in recent times, thanks to its potential pre-evaluation of materials' performance and impact on industrial production processes.
Through a collaboration among Politecnico di Milano (Department of Design and Department of Chemistry, Materials and Chemical Engineering "Giulio Natta") and Electrolux Professional S.p.A. (Global Research & Development, Innovation & Technologies Area), an evaluation of materials' tangible and intangible properties has been developed using non-traditional methods. Among all the currently professional appliances, the oven environment has been chosen as the most emblematic study case.
In the first part, this work evidences the major limits and critical points of the materials' selection tools currently and most commonly proposed in industrial applications. Within these, the main key points highlighted are the translation and connection of quantitative and qualitative properties and the risk associated to the materials selection process reliability. In a second step, some ameliorative hypotheses are built to overcome these limits, using a repeatable and suitable method for different materials selection cases.

Motivations and Objectives

The research aim is to develop an innovative and versatile method for the materials selection in professional appliances field, used by engineers and designers. From the Ashby [1] and the Karana [2] selection strategies, the non-traditional materials selection methodology would offer a complete evaluation of materials' tangible and intangible properties. Different variables, indeed, have been taken into consideration: material's technical properties (e.g. mechanical, thermal and processability parameters), durability (e.g. food chemicals and detergents), food-material compliance and customer perception of properties. The need of a unique materials selection method, able to convert quantitative to qualitative evaluation of properties and to estimate the risk associated to the materials selection reliability, driven the research. A procedure, which evaluates components' life and possible failure modes (based on DOE and FMEA) [3] [4] [5], is under development in order to integrate these information into the future products development.

Results and Discussion

The research presents the development of the materials selection methodology under consideration supported by some case studies that focus on durability properties of materials.

References

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