Human Centred Design of engineered surfaces and coatings

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Concept

This study presents the measurement and evaluation of the expressive-sensorial properties of newly manufactured surfaces and coatings that find many applications in the automotive field. The study was conducted with the purpose of understanding how material properties communicate with users through research into product-user interaction with the materials under development. Users perceive product quality through many aspects, including tactile properties, such as roughness and slipperiness. Sensory properties of interaction are expected to be a key product success factor [1]. User trials were performed in order to identify the perceptual qualities that characterise the sensorial properties of the concepts under examination (roughness, slipperiness and brilliancy) and the objective material qualities that can be physically measured (e.g. physical roughness, coefficient of fiction and gloss).

Motivations and Objectives

The aim of this work was to gain a clear understanding of how physical properties of aluminium and surface coatings correlate with their subjective perception. The objective was pursued by developing functional and advanced surfaces and by assessing the expressive-sensorial properties of these newly manufactured products. A set of samples consisted of uncoated aluminium substrates with different finishes and different coatings applied on the aluminium substrates was prepared and analyzed. A total of 40 volunteers were asked to rate their perceptions regarding slipperiness, roughness and brilliance of this set of samples. A semantic scaling (using a Likert scale) was adopted as a direct method to quantify subjective opinions about a particular attribute of the stimulus presented [2].

Results and Discussion

Sensorial test data were collected and physical properties were evaluated. The sensory attributes of roughness, slipperiness and brilliancy were correlated to the physical measurements of the surface characteristics and expressed by means of the well-known Stevens' Power Law [3]. A correlation was found between: the perceived slipperiness and the dynamic coefficient of friction (R^2 = 0.79, Fig.1); the gloss of coatings and both the perceived slipperiness (R^2 = 0.87, Fig.2) and the perceived brilliancy (R^2 = 0.86, Fig.3).

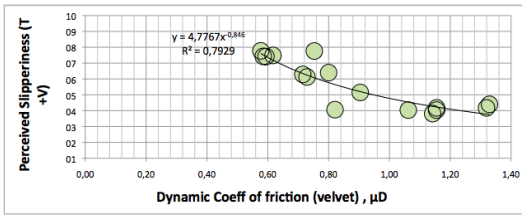

Figure 1 Ratings of *Slipperiness* as a function of *Dynamic coefficient of friction* for all samples without those uncoated.

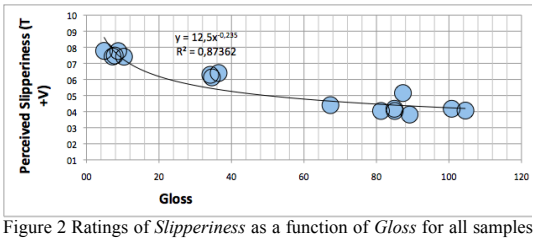

Figure 2 Ratings of *Slipperiness* as a function of *Gloss* for all samples without those uncoated.

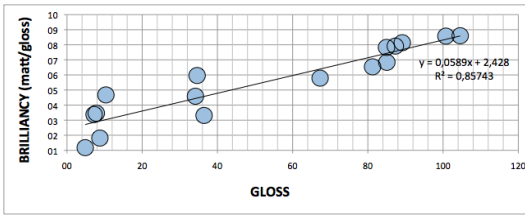

Figure 3 Ratings of *Brilliancy* as a function of *Gloss* for all samples without those uncoated.

References

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Acknowledgements

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