Improvement of material selection for plastic parts

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The assignment covers the improvement of the material selection for plastic parts, this is done by designing, prototyping and analyzing a design aid that helps the user to select materials.

Background

SIL Products focuses on the development of good consumer electronics for a fair price. Thereby SIL products aim is that a good-looking product should not necessarily be expensive, with the use of good design a low-price product can appear high end. This focus leads to a specific material selection for injection molded plastics. The selected material should not only fulfill the technical requirements, the product must also appear luxurious due to the selected material. Until now SIL products has not found a tool, method or application for material selection that considers material appearance elaborately.

For a new product development, designers and developers need to determine a suitable material for the project. The selected material must fulfill the requirements resulting from the demands of different stakeholders or the requirements resulting from analyses. The material selection can be done with the use of a selection tool or with the use of rough estimates and past experiences. Until now there was no selection method that considered appearance of the material thoroughly. The design aid supplies the needed insight in material specifications that contribute to the sensation of quality and luxury for consumers such as surface finish, surface quality and color. At the same time, it eases the material selection process for the development team. The improved material selection process can be relevant due to the decreased sampling costs since less sampling iterations are needed and material exploration possibilities are extended. Eventually final product quality can be improved thanks to a proper material selection.

The aim of this assignment is to improve the material selection process for plastic parts. This is done by evaluating the result of the design aid by means of the research question: “To what extend is it feasible to optimize the selection of material and production process for a new plastic product part?”. Note that the aim of the assignment is to assess the potential of a conceptual material selection tool. A detailed development and building a functional design aid is out of the scope of the assignment.

Approach

To test the concept of this easy to use material selection tool a mock-up prototype is developed. With the use of this prototype first user tests were performed to prove the potency of the design aid. Subsequently the results of the user tests are used for the redesign of the concept. The user test showed that the design aid was considered user-friendly and was valued as a potential alternative for other material selection tools.

Results & limitations

The design aid is a material selector as no other. It offers a streamlined focused functionality and it only considers thermoplastics relevant for injection molding. With the use of material characteristic filters, templates and visualization the selection process can progress fast and fluently. All is presented in a fresh
and serene environment creating a proper insight in the process and leading the users to their goals. The design aid is developed considering optimal cognitive ergonomics, using direct feedback to reduce overload of working memory and limiting the number of elements to keep all information comprehensible.

The user starts at the home screen to navigate to the different functionalities of the design aid (see Figure A). From there on the user can choose amongst others to determine their presets (see Figure B) or to browse and select for a suiting material (see Figure C). If the user has made a material selection, a report of the selection process is made (see Figure D). This report clarifies the material selections for stakeholders that are less involved in the process.

Conclusions & Recommendations

The design aid can be considered as a helpful tool for material selection that optimizes the selection process. The analyses lead to an insight in the material selection process combined with the user test. This assignment showed the potency of the design aid. Resulting from this assignment a concept material selection tool is now available for SIL product. This concept can be used for the development of the design aid. Recommended is to continue the development of the design aid and the design aid should be introduced to the market as an alpha version, from there on the design aid could be tested and improved thoroughly.

Figure A Home screen of design aid, used for navigation
Figure B Preset screen, used for creating presets

Figure C Material selection/browsing screen, used to select materials for a project
Figure D Report screen, used for making and exporting a report