A sustainable alternative to petrochemical product packaging

BSc Industrial Design Engineering

The aim of this Bachelors assignment was to introduce a more sustainable material to SP Packaging's packaging solutions. SP Packaging is a local company in Enschede that works together with customers (companies) mainly from the textile sector, retail and stationery, but also cosmetics. SP Packaging devises packaging designs together with those customers to add value to their products. SP Packaging's current solutions mostly include petrochemical plastics made from virgin raw materials. SP Packaging wants to introduce a more sustainable solution that reduces the use of virgin petrochemical plastics. This goal was translated into design requirements, which were subsequently used in the research phase to assess materials and in the design phase to assess the new packaging solutions.

Figure 1. Examples of SP Packaging's product portfolio (SP Packaging., n.d.).

The research phase was the most fundamental component of the assignment and emphasized the exploration and selection of alternatives to petrochemical plastics, specifically bio-plastics that are bio-based and bio-degradable. The results of the research demonstrated that bio-plastics are a very adequate alternative to conventional (petrochemical) packaging materials. A considerable amount of research is being conducted in the field of bio-plastics, there are a sufficient amount of options with regards to bio-plastics that all fulfill certain requirements. However, bio-plastics are not a perfect solution, as there are some practical limitations that prevent Bio-Based materials from being fully sustainable. These include (but are not limited to) industrial availability, material costs and material performance. Nevertheless, they are a more sustainable option with considerable future potential.

The design phase (partly) elaborated on the results from the research phase. The input from the research phase was used to determine the material composition of the new packaging solution. Besides the material composition, the physical composition of the packaging solution was designed. For this, SP Packaging's current packaging solution was taken as a base composition to iterate on. These iterations on the base model explored the alternative possibilities with respect to the different elements of the packaging solution.

The final design, a hybrid solution consisting of partly bio-plastic and partly recycled plastic bag with a recycled cardboard ribbon, makes great use of a common plastic from both a renewable and recyclable source. The mixing in of recycled plastic is an adequate solution for the generally low availability of bio-plastics, while making use of the plastic that has already reached the end of its lifecycle. The layer composition of the plastics attempts to conceal the slight imperfections of the recycled material, to increase the optical transparency. The cardboard ribbon, which can be disposed as a separate disposal unit, opts to decrease the amount of print ink on the plastic bag, optimizing the purity of the plastic for recycling. The material selected for the packaging solution can be processed using SP Packaging's current production processes.

Figure 2. Prototype of design solution

With this, the requirements for this assignment, together with the main objective of creating a more sustainable packaging solution, were fulfilled. Recommendations for future research would be to observe the development of bio-plastics and their practical possibilities. There is much future potential for bio-plastics due to their constant improvements with regards to industrial availability, material costs and material performance. Moreover, the design solution proposed in this thesis should be assessed based on pilot testing with samples of high fidelity. This will reveal any last critical points for improvement. Bio-plastics, specifically biodegradable plastics, require a different method of disposal than most common plastics, but seem to be the most environmentally friendly alternative with regards to the post-disposal impact.

References:

SP Packaging. (n.d.). Bedding & textiles. https://www.sppackaging.nl/packaging/bedding-textiles/

SP Packaging. (n.d.). Stationery. https://www.sppackaging.nl/packaging/stationary/