

Developing sustainable packaging solutions that align with future regulations.

(Green packaging project)

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The aim of this project is to redesign secondary packaging for vials and evaluate sustainable secondary packaging materials for Amgen's European production facilities, with a focus on improving environmental impact, operational efficiency, and compliance with the future EU Packaging and Packaging Waste Regulation. The project involves three different packaging configurations; one for a single vial, another for six vials and the last one for twelve vials.

Amgen is a leading biotechnology company with a mission to serve patients. They have a strong global presence, and their European production facilities play a pivotal role in manufacturing and supplying medicinal products. The client possesses extensive experience in pharmaceutical product development and manufacturing, operating with a diverse team that prioritizes innovation and patient well-being. At Amgen Breda, medicines are labelled, assembled, stored, and eventually shipped to various countries worldwide. Every day more than 1000 people from 41 different nationalities are working on supply chain processes, manufacturing, marketing, and sales of medicines and clinical research into new medicines.

The importance of solving this assignment lies in compliance with the EU packaging and packaging waste regulation (PPWR), so that supply to patients can be ensured and the mission to serve patients stays fulfilled. Additionally, focusing on sustainability addresses Amgen's commitment to reduce the impact on the environment.

The research question is stated as follows: How can Amgen re-design its packaging configuration to a more sustainable packaging configuration that will comply with the proposed EU packaging and packaging waste regulation?

To solve the problem, following key steps were performed: 1. Research and Analysis, 2. Collaboration, 3. Material Analysis, 4. Design and Prototyping, 5. Sustainability Assessment, 6. Prototype Testing, 7. Documentation and Presentation.

In the research phase, it shows a comprehensive literature review about sustainable packaging materials and their characteristics. Then, a decision matrix was made to compare common packaging materials based on availability, cost, processability, recycled fraction in current supply, recycled content, carbon footprint, water usage, & printability. Based on an evaluation of the given criteria two distinct options emerge: a plastic-free option that serves as a long-term solution that includes mono-packaging as a sustainable strategy, and a short-term solution that includes plastics to meet immediate needs or specific criteria. GC2 (Folding Box Board; Manila back) was selected as the plastic-free option and R-PET (Recycled Polyethylene Terephthalate) was selected as plastic option.

In concept phase and detailing phase, it shows different concepts for all 3 packaging configurations. Then, all concepts were evaluated based on feedback from Subject Matter Experts (SMEs), characterization and drop testing simulations. The final designs were created using a mono material (GC2), resulting in a percentage volume reduction to current packaging configurations with respectively x%, y% and z%.

Furthermore, suppliers proposed potential concept designs based on their experiences which enriches the diversity in viable solutions considered within the study. Both the supplier-driven designs and those proposed by the author underwent rigorous assessment through Life Cycle Assessment (LCA), evaluations focusing on how much volume is reduced, an analysis concerning integration with operational processes and manufacturing feasibility as well as examining cost implications. Based on the assessment the supplier's designs were selected.

In the evaluation, it shows that the aim of the project is fulfilled; Amgen can re-design its packaging configurations to more sustainable packaging configurations. The final designs comply with the packaging and packaging waste regulation (PPWR). For both short-term solution and long-term solution allow for recycling and meet packaging minimization requirements.

The next step in this project is performing qualification testing packaging configurations. These tests are designed to verify that the packaging meets certain predefined standards and requirements. This process also involves conducting an assessment for incorporating artwork on new leaflet sizes and on new carton sizes. Additionally, the cost analysis part was not considered for this project due to a delay in receiving the necessary information from suppliers. As a result, the next step the costs associated with all the concepts will be evaluated. Depending on these findings, it is possible that the final design choice might be altered.