

# Circular medical packaging

## Introduction

According to the Swiss Federal Statistical Office [1] and the sustainable development goal 12 [2], economic growth should increasingly be decoupled from raw material consumption. The Institute Straumann AG manufactures dental implants (see figure 1) and oral restoration products and are partly subject to sterile medical regulation. Therefore, the blister and logistical packaging is oriented towards compliance and productivity but not for sustainable usage. Accordingly, this study has the goals to:

1. Identify packaging stakeholder requirements along the supply chain
2. Identify relevant material waste opportunities
3. Develop optimization approaches
4. Evaluate the approaches for cost and benefit
5. Initiate the implementation (optional)

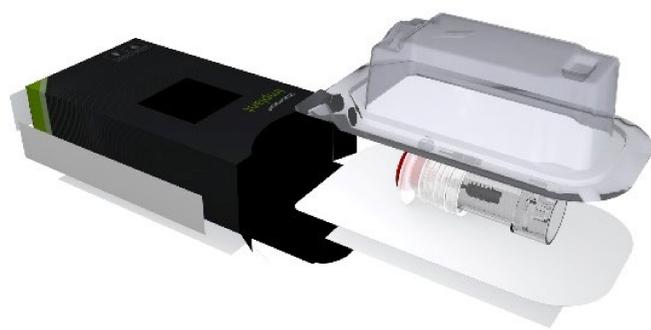


Figure 1: One of 12Mio blister packaging sold with the example of a titanium implant

At least 7 different polymers multiple fused paper fibers and composite materials can be counted: A crystal clear COC vial and tray sealed with a PE lid, held in a PET-GAG-co-extruded tray, sealed with Tyvek film using a resin-polymer glue, with product information labelled and packaged in a product carton

## Results

Unmet customer needs and unused material opportunities and certification requirements were uncovered. Dentists and especially technicians were observed to be overwhelmed and unsatisfied with the multitude of products and individually packaged products.

30 tons each of non-recyclable composite blister packaging and logistical cardboard to and from the manufacturing facility were selected for further process evaluation due to high mass and individual collection points. Adjustments in materials, design, and production processes allow for recycling of plastics. It was also found that the benefits would remain limited if the sealing method is not changed. Modifications or harmonization can 26 tons of cardboard reusable. Finally, paper banderoles eliminate contamination in cardboard recycling and ease handling in the warehouse.

A sample of modified and satisfactory cardboard was made (see figure 3 & 4). A paper version of banding was ordered for testing. And the development of a fully recyclable blister was joined.



Figure 3: Circularity is also concerned with the logistical packaging. 8 tons of the pictured cardboard can be reused, if an alternative design is chosen (see figure 4)

Figure 4: Cardboard sample with a removable cardboard lid to enable reuse and easier handling in storage.

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**Lecturer:** [1] - BFS: MONET 2030, [shorturl.at/hAEIS](https://shorturl.at/hAEIS) (accessed Mar. 12, 2022).

[2] - UN: Goal 12, <https://sdgs.un.org/goals/goal12> (accessed Mar. 12, 2022).

## Methods

1. Identification of the needs and potentials of clients, actors in the current supply chain as well as recycling providers with on-site visits, market investigations and conversational interviews.
2. Evaluation of relevant materials with the mass and distribution of the waste.
3. Investigation of process potentials for waste prevention, reduction, reuse, and recyclability through different packaging designs, supply chain processes, and end-of-life options.
4. Evaluation on the approaches using a semi-quantitative evaluation method. The environmental benefits, the impact on customers, and the process and financial costs were taken into account.
5. Initiation of the most efficient and effective measures

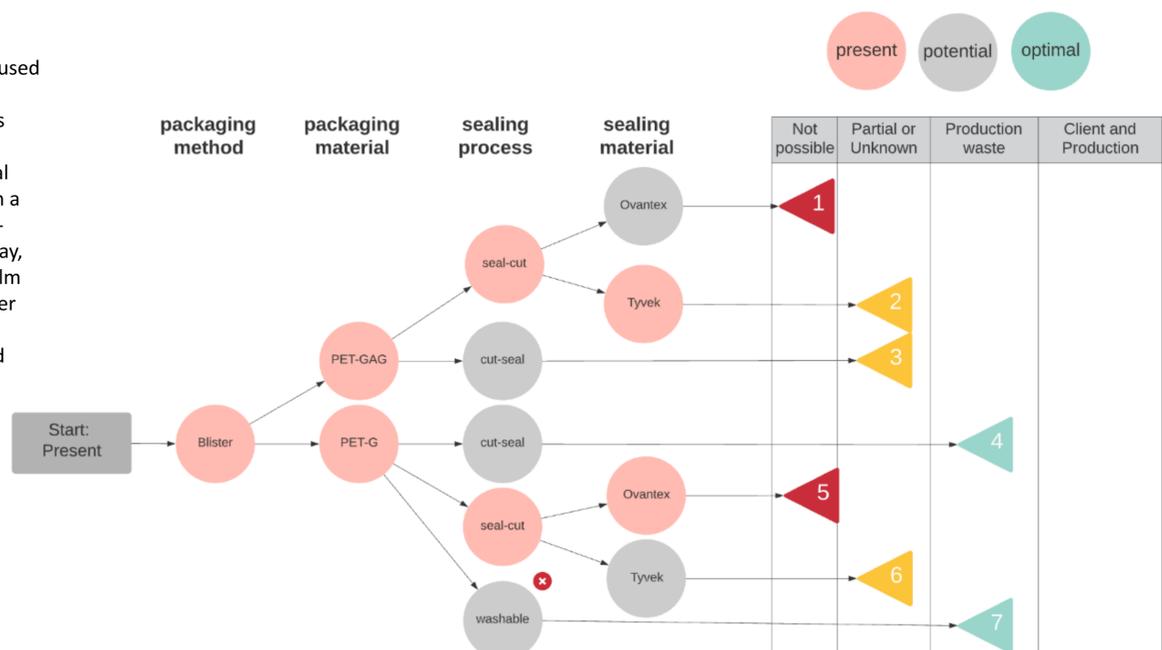


Figure 2: Simple variations of the current production process do not result in the desired results. More disruptive approaches were investigated.

## Conclusion

Alongside strictly medically regulated packaging, there are also simpler recycling potentials. The successful investigation of the current supply chain identified design and material considerations as a systematically scaled and efficient measure to increase material efficiency and customer satisfaction. As a first step, the further development of sustainable procurement management according to a systematic and area-wide method can be recommended. Further measures that can be recommended are as follows:

1. Monomaterial and adhesive-free blister redesign.
  1. A market-new recyclable blister design is being developed in collaboration with KpNext thanks to this study and should be driven forward (see figure 5).
  2. Creating volume and assorted packaging for greater customer satisfaction
  3. Differentiation of technician products for reducing packaging and making it more sustainable
2. Removable lid design for sterilization cardboard enables multiple reuse of otherwise single used and discarded 8 tons of cardboard.
3. Standardization and reuse of cardboard with suppliers can make multiple use of 18 tons of cardboard
4. Changeover to the paper variant of banderoles simplifies global recycling and handling.



Figure 5: The envisioned recyclable blisters can be disposed into the RIC-1 PET recycling