3.1.1 Current system – Red Shoe Box

The current design is shown in Figure 2 and consists of a Red Shoe Box as well as wrapping and stuffing paper. The Red Shoe Box is built of a 100% recycled corrugated material and a layer of paper. The red color is applied before the box gets folded.

The average weight of one red box is approximately 0.238 kg. As an average the corrugated material makes up 90 weight-% and the paper 10 weight-% of the box

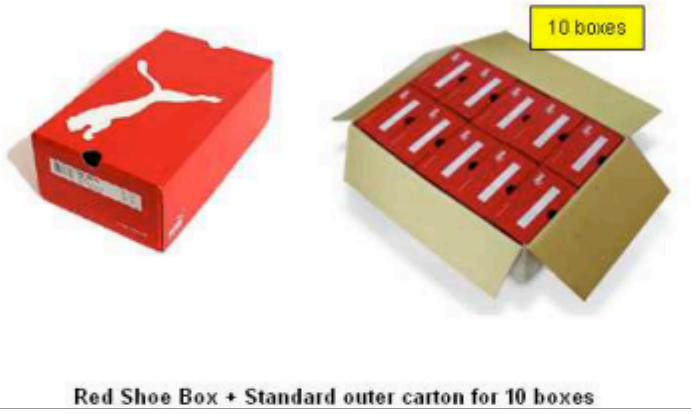

Figure 2: Current system – Red Shoe Box

To prevent damage during transportation the "Red Shoe Boxes" are transported in a standard outer carton which holds 10 boxes (outer carton size is/ can be customized for PUMA needs).

3.1.2 Design option 1 - Pulp box and polymer bag

The new design "pulp box and polymer bag" is shown in the following figures. As illustrated in the figures the new design varies depending on the point of sale. If the final point of sale is "Wholesale" the new design consist of a pulp box and a polymer bag, (see Figure 3) while if the final point of sale is a PUMA store the new design is only the polymer bag, (see Figure 4). The pulp box is made of 100% recycled paper (70% corrugated; 30% newsprint) and weighs approximately 0.212 kg. The average weight of the polymer bag is approximately 0.027 kg and can be made of Polypropylene (non-woven) or a Biopolymer (corn starch-based and PVOH). The weight is independent of the used polymer. Both alternatives will be assessed within this study.

Figure 3: Design option 1 - Pulp box and polymer bag - Wholesale

To prevent damage during transportation the "pulp box and bag" must be transported in a slightly broader outer carton (~2 cm) in order to hold 10 boxes.

Figure 4: Design option 1 - Pulp box and polymer bag – Retail "PUMA store"

To prevent damage during transportation the "bags" are transported in a slightly longer carton which then could hold up to 12 bags. The design requires a divider system which is designed similar to a "wine crate divider" system. This adds approximately 0.550 kg of corrugated material to the weight of the standard carton.

3.1.3 Design option 2 – Clever Little Bag

An alternative new design option is illustrated in Figure 5. It consists of a non woven polypropylene bag and corrugated "bone" providing stability to the design and ensuring at the same time that there is no contact between the shoes. The design of the bag is different compared to design option 1 and due to the missing middle layer the bag weight could potentially be 25% lower compared to the above mentioned bag (see 3.1.2.). Therefore the weight of the bag is approximately 0.02 kg. The same corrugated material as for the current design (100% recycled material) is used for corrugated "bone" and weighs approximately 0.082 kg.

Figure 5: Design option 2 – Clever Little Bag

To prevent damage during transportation, 10 “Clever Little Bag” units can be transported in the same standard outer carton that is used for the Red Shoe Boxes.