

Project Design Specification

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Problem Statement:

Currently, artists perform the procedure for skin coloration of facial prosthetics manually, which requires a lot of time, energy, and money. However, there are numerous similarities among individuals from similar regions of the world. Therefore, our client proposes a systematic method to mass-produce the different layers of skin for skin prostheses.

Client Requirements:

- Design a systematic procedure to color prosthetic skin
- Find a suitable substrate for production
- Devise a method to quantify skin color

Design Requirements:

1. Physical and Operational Characteristics

a. Performance Requirements- The design must be low-cost, safe to use and produce natural looking skin tones.

b. Safety- Materials must be non-toxic and hypoallergenic. Process must not cause harm to the operator and may require FDA approval.

c. Accuracy and Reliability- Produce prosthetic skin that precisely matches the natural skin color of the patient.

d. Shelf Life- The prototype of the process must last at least 5 years and withstand frequent use. The color applied by the process must last so that it will not need touch-ups for 6 months.

e. Operating Environment- The prototype of the process will operate at room temperature.

f. Ergonomics- The prototype of the process will be operated on a table for presentation purposes. It must also be easy to operate by one person.

g. Size and Shape- The prototype of the process will be no more than 3 cubic feet.

h. Weight- Not applicable to design.

i. Materials- Prefer materials to be silicone-based, but any substrate will work.

j. Aesthetics - It should be streamlined in appearance.

2. Product Characteristics:

a. Quantity- Only one final design process is needed.

b. Target Product Cost- The device should stay within the client budget, ideally under \$500.

3. Miscellaneous:

a. Standards and Specifications- Not applicable since silicone is widely used in prosthetics and other medical products.

b. Customer- The substrate that will be used should preferably be silicone, but polyurethane and thermoplastic elastomer (TPE) are also options. Silicone-based paint will be used.

c. Patient-related concerns- The color must match the natural skin color of the patient.

d. Competition- Similar prosthetic devices exist which are mainly created manually. Currently mass-produced prosthetic skins are unnatural looking. This team will combine merits of the two processes, therefore creating mass-produced natural looking skin.