

Project Design Specifications:

1. Physical and operational characteristics

- a. *Performance requirements:* When in use, the device will need to be functioning continuously and accurately. It must make user aware of deviation of more than 0.5°C from required temperature (37°C).
- b. *Safety:* The device should not pass more than $10\ \mu\text{A}$ through the water, so as to not harm any living tissue that will be in the water bath. The casing for the device should also withstand temperatures of 50°C .
- c. *Accuracy and Reliability:* The device should be able to detect temperature change of 0.1°C .
- d. *Life in Service:* The device, not including battery, should be able to last two years of daily use, eight to ten hours per day. The battery should last approximately 50 hours.
- e. *Shelf Life:* Device should last at least five years, while the battery should last one year under ambient conditions of temperatures ranging from $0 - 40^{\circ}\text{C}$.
- f. *Operating Environment:* $17 - 45^{\circ}\text{C}$. The device can be used while fully submersed in water.
- g. *Ergonomics:* Hand held size, lightweight, portable.
- h. *Size:* Maximum size $1'' \times 1'' \times 4''$, internal circuitry will not be accessible for maintenance because of coating.
- i. *Weight:* optimum weight is less than half a pound ~ 230 grams.
- j. *Materials:* Water resistant materials for coating, other restrictions include economically affordable materials that are temperature resistant up to 50°C ; materials should also be reliable - allowing for a shelf life of five years.
- k. *Aesthetics, Appearance, and Finish:* The device should be compact, rectangular, and have no sharp edges.

2. Production Characteristics

- a. *Quantity:* One initial prototype, if successful and desired by client, the client will need 500 units.
- b. *Target Product Cost:* Total costs for mass manufacturing should not exceed \$3.00 per unit.

3. Miscellaneous

- a. Standards and Specifications: N/A
- b. Customer: Fully submersible, affordable, reliable, heat resistant
- c. Patient-related concerns: Safety for children within water baths, there can be no more than $10\ \mu\text{A}$ passing through the water.
- d. Competition: There are several digital thermometers on the market with audio/visual alarms, however these are all well above our price range, ranging from \$15-35.