

## **Problem Statement**

Marc Patterson is a seven year old boy living in Oregon, Wisconsin. He was born with Cerebral Palsy, Cortical Blindness, and Epilepsy. He is making good progress at home and school, but he still is dependent on his parents for virtually everything. Marc needs to be changed a few times a day and he has grown large enough that it is getting very difficult to lift him onto his changing table. The goal is to design a changing table which can alternate its height so that it is easier to place Marc on the changing table.

## **Client Requirements:**

- Must cost no more than \$400
- Must be able to alternate its height to make lifting Marc easier
- Must be powered manually or with electricity
- Must be able to support a 50 lb boy

## **Design Requirements:**

### **1. Physical and Operational Characteristics**

#### *a. Performance Requirements*

The changing table must be able to alternate its height while also supporting a 50 lb boy.

#### *b. Safety*

It must alternate its height at a safe and manageable rate. This is to ensure that Marc feels safe while on the changing table.

#### *c. Accuracy and Reliability*

Our design is expected to be close to 100 percent reliable, correlating to raising and lowering the table safely every time. The device is designed to be highly accurate and deliver desired heights with a +/- 6-inch range.

#### *d. Life in Service*

The device is designed for continued use. The client expects to use the table for changing 5-10 times a day. A single use will consist of a 2-step cycle, going up and then lowering back down. The device must also be cleaned daily and sanitized after every use.

#### *e. Shelf Life*

The client requests a shelf life of 2-3 years, but the expected shelf life for the device is up to 10 years. The limiting factors for shelf life on the device is the mechanical design used for raising and lowering the table and Marc's growth rate (height and weight).

#### *f. Operating Environment:*

Our device would be used in bedrooms, or other household rooms. This does not mean that our device should only work in these places. It should be capable of performing on any flat surface.

*g. Ergonomics:*

The device must be extremely user friendly. Anyone who is at least 1.5 meters tall should be able to operate the device with ease.

*h. Size:*

The changing table must be 60 in long x 20 in wide so Marc can comfortably lie down. The height of the changing table will range from 12-36 in.

*i. Weight:*

The weight of the changing table will be light enough so that two people can move it by hand. In order to accommodate this request, the changing table will weigh between 100-150lbs.

*j. Materials:*

The materials used, mainly wood, must be aesthetically pleasing considering the changing table will be placed in a bedroom. The materials must also be durable because the changing table will need to stay intact for many years.

*k. Aesthetics, Appearance, and Finish:*

The wood used to make the changing table will have a clear, glossy finish to match other objects in the room.

**2. Production Characteristics**

a. *Quantity:* 1 deliverable.

b. *Target Product Cost:* Less than \$300 -\$400

**3. Miscellaneous**

a. *Standards and Specifications:* N/A

b. *Customer/Patient related concerns:* N/A

c. *Competition:* There are other specialty changing tables on the market that range in price from \$2,000 up to \$5,000.