

# **Product Design Specifications (PDS)**

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## **Platform for arm support during radiologic procedures**

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### **Function:**

The designed platforms will offer maximum comfort to patients, especially older people, while they undergo radiologic procedures involving the spine. By supporting their arms during these procedures these platforms will allow patients to relax and not be in pain. Currently, patients must lie on their stomach and hold their arms outstretched to allow access of the x-rays. In older individuals, however, this becomes tiresome and painful during the exam.

### **Client Requirements:**

- Develop platforms so a patient's arms rest on the sides of a table – don't want them to dangle
- Problem – older people have more difficulties
- Younger people probably won't need the platforms – more flexible and limber
- Platforms should be removable
- Procedure length – normally about 1 hour
- Platforms don't need to be sterilized
- X-Rays should travel through the platforms
- Adjustable angles and lengths may be beneficial
- Should be able to withstand spills and cleaning using solvents such as alcohol

### **Design Requirements:**

Must be small enough to fit within the circular motion (360 degree rotation) of the radiologic device that moves around the patient.

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

- a. *Performance Requirements:* The devices must allow the patient to relax their arms during the radiologic procedure. The platforms should be capable of being used multiple times throughout the day and they should be removable.

- b. *Safety:* The platforms should ONLY be used for radiologic procedures. There should be no sharp edges on the devices to avoid any harm to the patients.
- c. *Accuracy and Reliability:* The devices must be sturdy and be able to hold up to approximately 30 pounds - the maximum weight of a patient's arm (patients are 300 pounds or less due to limitations of the radiologic table).
- d. *Life in Service:* 10 to 15 years (the device should last for many years if taken care of appropriately). In most cases, the device will last until dropped, mishandled, or until the material (velcro, fabric, or plastic) wears out.
- e. *Shelf Life:*
- Store in cabinet in X-ray room (no extreme temps, pressures, humidities, etc...)
  - Shelf Life of product
    - Plastic: unlimited
    - Metals (if used): unlimited
    - Velcro (if used): 10-15 years (until Velcro is no longer functioning)
- f. *Operating Environment:*
- Temperature, pressure, humidity all in typical "room" ranges
  - Exposure to dust from the air
  - Exposure to X-rays
  - Handled by physicians/technicians and possibly patients
  - Possible shock loading situations (i.e. – patient loses balance while getting onto table and uses device to catch themselves, placing patient's full weight on the device)
- g. *Ergonomics:*
- Comfortable for the patient
  - Physician friendly
    - Easily adjustable (i.e. – moving parts, if any, not too small; not too much force required for adjustment)
    - Easily removable
- h. *Size:*
- Plastic portion that goes under table pad no more than 20 cm long
  - Adjustable length
  - Adjustable angle (not necessary)
    - From 20 to 70 degrees
  - Short enough so as to not interfere with x-ray source and/or cathode tube
  - Plastic thickness of about 5 mm
  - Table is slightly concave (about 2-3 degrees)

- i. *Weight*: The platforms should be light enough so a doctor can easily remove them from their stored location and position them underneath the patients' arms. Each platform should not exceed 10 pounds.
- j. *Materials*: Ideally, the material used for the platforms shouldn't interfere with x-rays in any way. For this reason, most metals should be avoided if possible. The platforms may be built out of plastic or maybe some kind of fabric. The material will not have to withstand autoclaving procedures because the platforms will not be used during surgeries.
- k. *Aesthetics, Appearance, and Finish*: Should be professional looking, with no jagged edges or surfaces that could catch clothing or cut the skin. The color is irrelevant for the purpose of the device.

## **2. Production Characteristics:**

- a. *Quantity*: Two working prototypes (one for each arm).
- b. *Target Product Cost*: The total cost has been estimated at \$150 for each platform.

## **3. Miscellaneous :**

- a. *Standards and Specifications*: No special regulations have to be met.
- b. *Customer*: Intended use is for people over 55. Must be comfortable (a.k.a. no sharp edges, padding, and angle/length fitting), adjustable, removable, and capable of withstanding pressure from the arm.
- c. *Patient-related concerns*: The platform will not be sterilized, however, it will be reusable. It must be easy to use and adjustable to fit arm appropriately.
- d. *Competition*: Through several patent searches, one product was found that may be similar to the device desired by the client. This product is United States Patent number 5,549,121 and is titled "Surgical Arm Support."