

Product Design Specifications – September 13, 2011

Project 12: Embouchure Device

Team Members

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Problem Statement

Bell's Palsy, a condition affecting the 7th facial nerve, can cause hemifacial paralysis and weakness in facial muscles. During recovery, the facial nerve can regenerate forming new pathways causing voluntary and involuntary muscle contractions simultaneously. For a patient with this disorder, known as synkinesis, maintaining proper embouchure is problematic as the buccinator, platysma, and zygomaticus counter-contract. Therefore, an embouchure assistive device will be designed for a clarinetist afflicted with synkinesis to help maintain pressure on the mouthpiece of the clarinet which will reduce air leakage.

Client Requirements

- Maintain embouchure by counteracting unwanted facial muscle hyper-contractions
- Easy to engage and disengage as needed
- Removable cloth covering
- Preferably a headpiece
- Lightweight
- Device will increase playing time to at least thirty minutes

Design Requirements

1. Physical and Operational Characteristics

- a. Performance requirements
 - Maintain constant corrective force on cheek while playing clarinet
 - Intended for daily use
- b. Safety
 - Materials used should not cause allergic response
 - Should not inhibit breathing or vision
- c. Accuracy and Reliability
 - Able to provide a wide range of supportive forces
 - Adjustable point of contact within cheek area
 - Capable of fine adjustment
- d. Life in Service
 - 1000 engage/disengage cycles (approximately three years if used daily)
- e. Shelf Life
 - Non-perishable
 - Should tolerate wide temperature range during storage
 - -30°C to 50°C

- f. Operating Environment
 - Used in warm environment
 - 37°C based on body temperature
 - In contact with perspiration, skin oils and saliva
- g. Ergonomics
 - Only intended for cranial use
 - Device should not cause undue stress on neck and shoulder
 - Training not required
 - No force greater than 3kg applied to face
 - Engage/Disengage time less than 30s
- h. Size
 - Small enough for transportation in one hand
 - Should not encroach on surrounding musicians' vision
- i. Weight
 - Less than 1.5kg
 - Weight should not induce fatigue
- j. Materials
 - Avoid latex
 - Lightweight
 - Durable
 - Cloth covering
 - Easy to wash
 - Capable of sterilization
- k. Aesthetics, Appearance, and Finish
 - Inconspicuous
 - Neutral colors
 - Professional appearance

2. Production Characteristics

- a. Quantity
 - One device
- b. Cost
 - Less than \$200 for development and materials

3. Miscellaneous

- a. Patient-related concerns
 - Device will be sterilized between uses