Project 36: Reptile Face Mask for Pneumotachometry

Product Design Specification

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Problem Description:

Develop a face mask for use in reptilian pneumotachometry. Four masks will be constructed, with two masks made for corn snakes (Elaphe guttata) and the second pair for use in bearded dragons (Pogona vitticeps).

Client Requirements:

- Reusable
- Lightweight (approximately 3g)
- Does not harm animal  
  o Must not choke animal  
  o Must not be glued to animal
- Airtight
- Input and output ports  
  o 1 cm diameter input/output ports  
  o Air from the input port should not blow directly on reptile face
- Devices must fit heads of respective species
- Must be rigid to avoid deflection during breathing
- Corn snake mask must be constructed first
- Must maintain airtight seal for up to 8 hours

Design Requirements:

A. Performance Requirements
- Must have good precision (consistent performance)
- Must be airtight
- Must be durable and be resistant to animal interference
B. Life in Service
   - Must be reusable
   - Airtight seal must perform for up to 8 hours at a time

C. Operating Environment
   - Must operate in room temperature air
   - Must operate under heat lamp

D. Size
   - Must fit on respective reptilian head
   - Should not be large and bulky

E. Weight
   - Must be lightweight
   - Must be approximately 3 g

F. Materials
   - Must not be toxic to reptiles
   - Must be allergen-free

G. Safety
   - Must not choke the reptile
   - Must not be adhesively attached to reptile

Production Characteristics

A. Quantity
   - Two masks for corn snake experiments
   - Two masks for bearded dragon experiments

B. Target Production Cost
   - Previous design #1:
   - Previous design #2:
   - Snake Design:
   - Bearded Dragon Design:

Design Concerns

A. Bearded dragon design challenges:
   - Spikes around the neck prevent the airtight seal
   - “Beard” also complicates the airtight seal
   - Has the ability to remove mask with front legs
B. Dead Space
- Tighter fitting mask may decrease background noise
- Rigidness of mask may affect amount of dead space

C. Reptile Visibility
- Opaqueness/Transparency may affect reptile behavior
- Reptiles are color blind (no color preference)

Miscellaneous

A. Competition
- No previously manufactured designs
- Homemade designs in existence, but no patents issued

B. Standards and Specifications
- See Animal Protocol