

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
- Rigidity 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