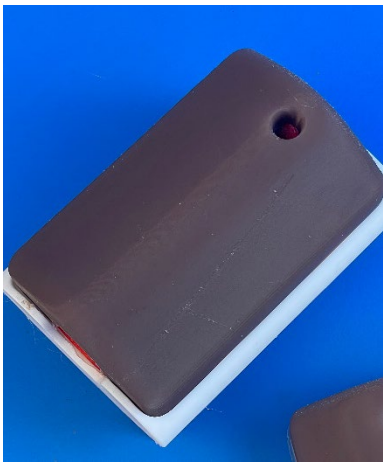
Tracheostomy Simulator

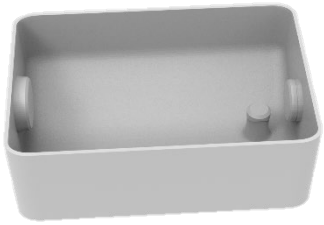
Materials: PLA, TPU, Silicone, Pigment (optional), Release Agent
Additional tools and materials: N/A
Manufacturing methods: 3D printing, casting
Estimated cost: $32
Contributor: Nina Patel
Designer: Nina Patel, Scott Drapeau
Documentation: Scott Drapeau



This is a novel low-cost, high-fidelity 3D-printed tracheostomy model with an over-molded cast of silicone and TPU to enhance simulation-based training.

Individual parts that will be manufactured with 3D printing:

Base



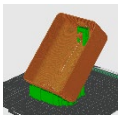
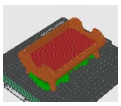
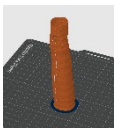
Mold

Trachea

Instructions

3D-print all parts first. Unless otherwise noted, PLA is the default filament, and the print quality is at the lowest/draft setting with occasional adjustments to wall loops/perimeters and infill for added strength. Download STL files here.

3D printed parts list information

Name of part	Grams	Perimeters	Infill %	Notes	Orientation
Mold	156	2	15	Printed at an angle for optimal quality for casting, with painted supports	
Base	187	2	15	Painted supports as needed	
Trachea	11	5	N/A	Printed in TPU filament, vertical orientation with a brim	

*Note

The Mold is printed at a roughly 45-degree angle with painted supports as needed. If the Mold is printed flat, the 3D-printed layers will more evident, thus transferring to the cast.

Assembling Mold Parts

1. Affix the Trachea to the Mold as shown. There are three projections in the mold to hold the Trachea tightly and prevent seepage of silicone during casting. The hole located on the front of the Trachea will slip over the projection located at the bottom of the Mold and snuggly fit into place within a visible groove.

Casting

1. Spray the mold assembly (Trachea and Mold) with release agent.
2. Prepare silicone according to manufacturer's instructions with optional pigment and pour into the mold until silicone reaches the top.

3. Once cured, peel out the casts with the embedded Trachea.
   *Note: The Trachea will remain inside the casted silicone. Some silicone may leak and cure near the openings of the Trachea and can be trimmed with scissors.

Assembly

1. Place over-molded cast into the base.

Maintenance

All parts are soap and water safe, if cleaning is necessary.