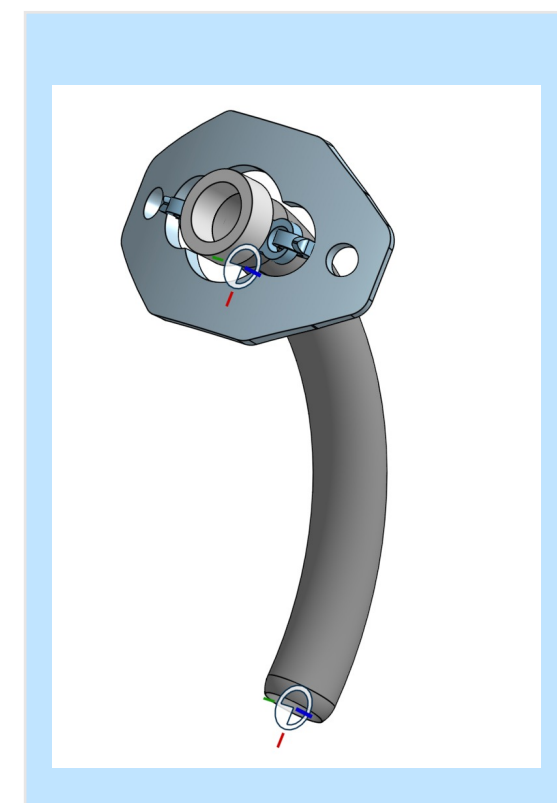


## Introduction

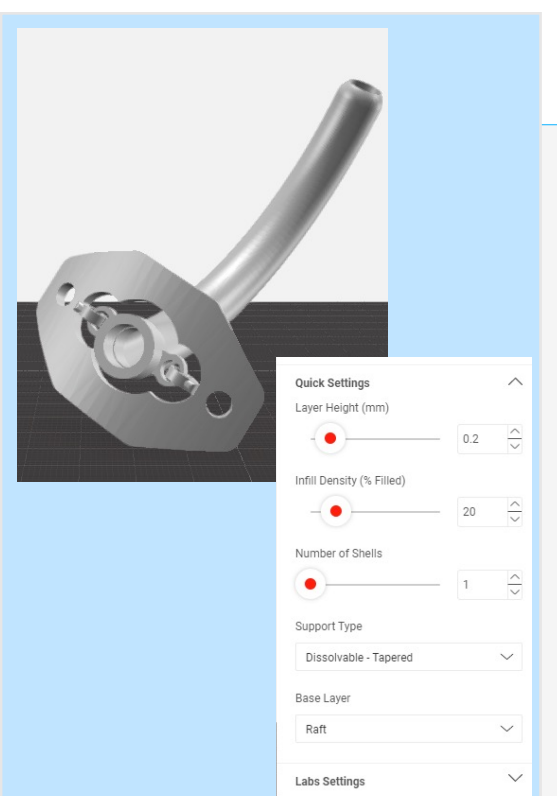
Tracheostomy is a common otolaryngology procedure and there are a variety of standard tracheostomy tubes available. For some patients, the available tracheostomy tubes do not ideally fit due to obesity or anatomical variations. In addition, there has been a shortage of available standard tracheostomy tubes and long wait times for custom tracheostomy tubes with recent supply chain issues.

## Material and methods



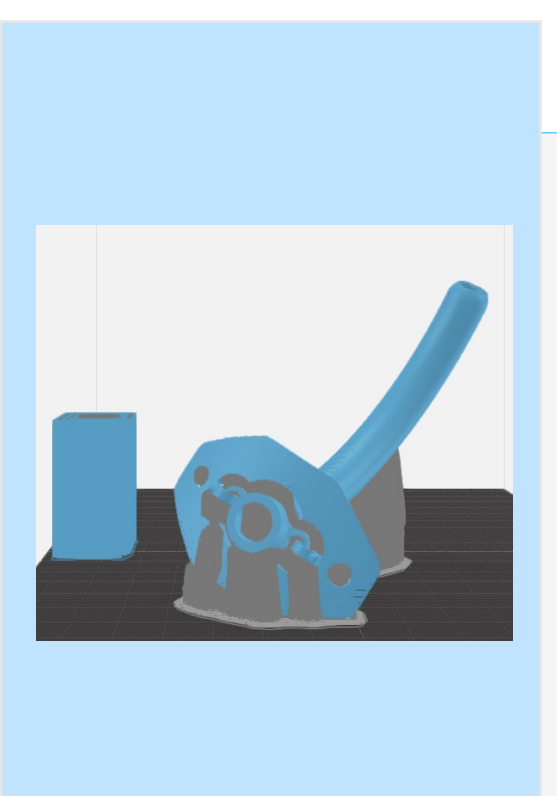
### Design STL file

- Can easily manipulate dimensions
- Plan movement mechanism



### Slicing software

- Integrated into Makerbot
- Set printing parameters
  - Impacts tensile strength and diameter



### Print

- Maker Bot Method Conrad X 3-D printer
- PLA- biocompatible
- PVA- dissolvable support



### Post processing

- Dissolve PVA

## Results

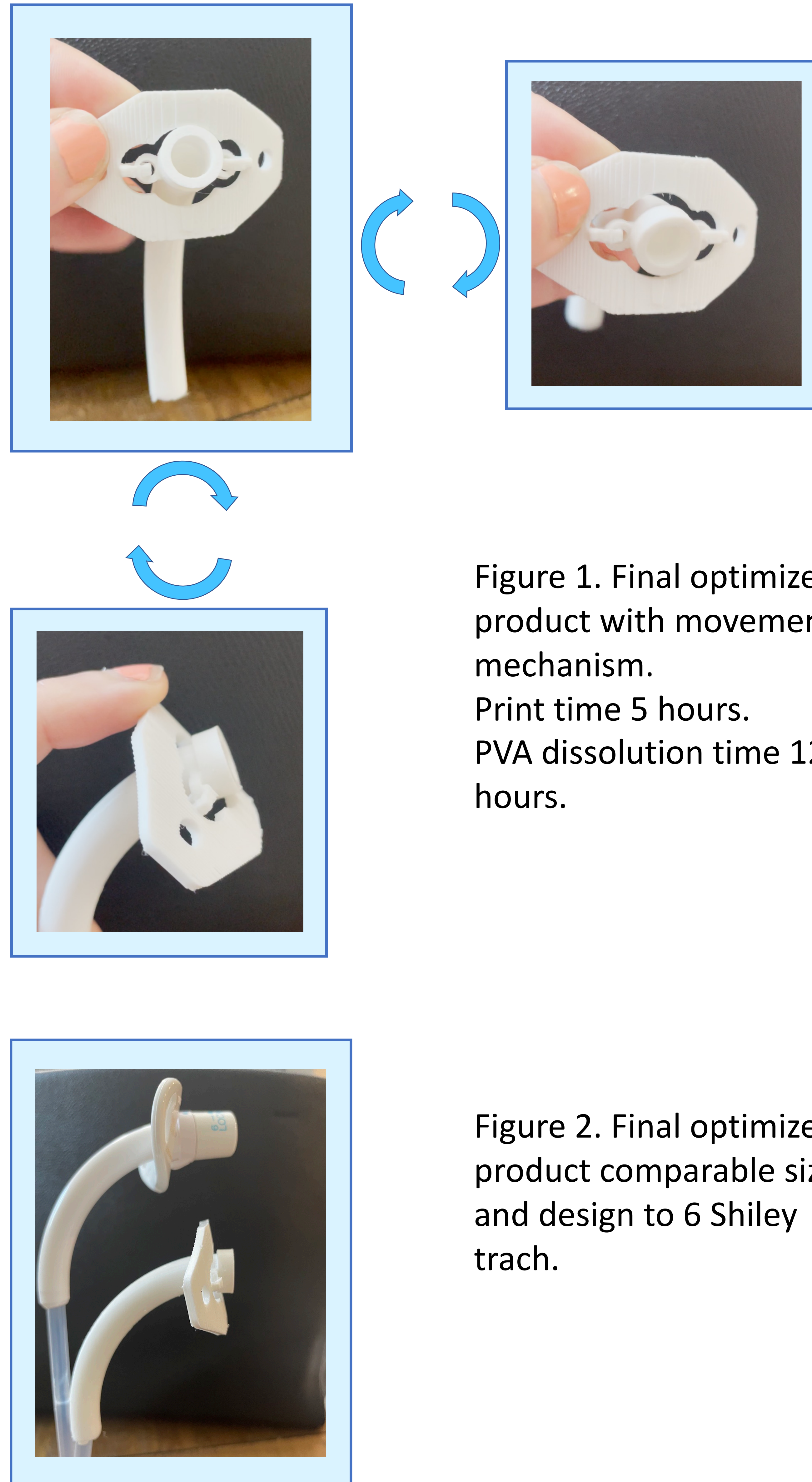


Figure 1. Final optimized product with movement mechanism.  
Print time 5 hours.  
PVA dissolution time 12 hours.

Figure 2. Final optimized product comparable size and design to 6 Shiley trach.

## Future Directions

- Test durability
- Test structural integrity after sterilization
- Post processing modifications
  - Smooth ridges
- Possible coating with potential drug delivery
- Approval for clinical use
  - Less rigorous standards, not implantable, use <30 days

## Conclusion

This successful 3D print lays the groundwork for custom 3D printing tracheostomy tubes at the point of care for planned tracheostomy procedures.

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