# **Methodologies of Pouring PATCH Silicone Molds**

## Patrick Wynne, Erika Hagen, Austin R.J. Downey, and Bridget Armstrong

University of South Carolina, Departments of Mechanical Engineering and Exercise Science

#### Introduction

- The Platform for Accurate Tracking of Children's Health (PATCH) project is an open-sourced children's fitness tracker providing researches with raw health data.
- The electronics are encased in Liveo's MDX4-4210 Biomedical Elastomer which was chosen for its biocompatibility and durability.
- However current molding methods result in air-pockets, deformations, and incomplete cures, compromising strength and consistency.
- The goal of this project is to develop an optimized casting method to eliminate air pockets and deformations by improving elastomer preparation and mold design.

#### Methods

#### Silicone

•Mixture is prepared using 10 parts base elastomer and 1 part curing agent.

•The silicone is then degassed by subjecting it to a vacuum of 730 mm Hg for 30 minutes, with vacuum released at the 20-, 15-, and 5-minute marks.

•The silicone is carefully poured into the mold as to prevent air from being trapped and left to cure for 40 hours at room temperature (23°C).

#### Mold

•The original mold was split, ensuring the shell remains a single component while the interior rectangle is separate, enabling compression molding.

 Increased the number of escape holes to allow excess silicone to flow out when the halves are pressed together. • Silicone is poured into the bottom section, and compression of the two mold halves ensures complete cavity filling.

### Significance

- Optimizing the casting of the cases, will ensure that they are consistent in quality and durability and ensures that the electronics they house are protected while on children.
- Creates clear instructions for other researchers on how to cast their own cases reliably.



Original mold (left) and New Compression mold (right)

#### Results

- Degassing silicone eliminated all deformities, resulting in durable casting.
- New plunge compression mold allowed for easy pouring, removal, and trimming of excess silicone.



Casting with original mold and no degassing. Note the many large airpockets and smaller bubbles.











Casting with degassing and improved mold. No air-pockets or bubbles.

### Conclusion

- cases.
- cures.

#### **Next Steps**

Develop methods for mass producing cases by exploring Increasing curing temperatures over 23°C for reduced

- curing times.

#### References

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Degassing the silicone mixture prior to pouring into compression mold, creates reliable, consistent, and durable

The new compression mold ensures that the silicone completely fills the mold eliminating the chance for incomplete

The removal and trimming of finished cases from the new mold is easier compared to the original mold.

Comparing multiple single-cast molds to large multi-cast molds to determine which is more efficient and user friendly.

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