

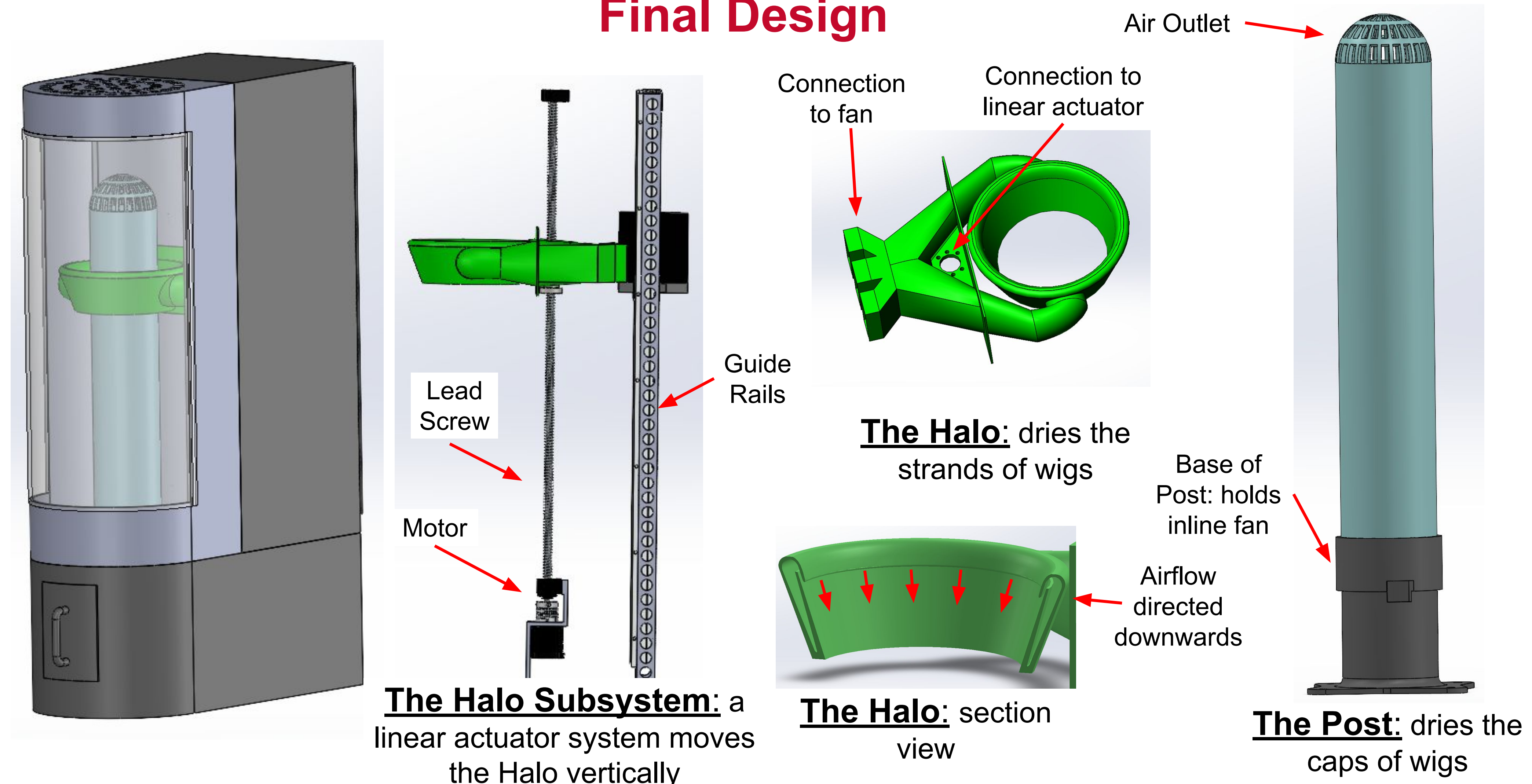
### Motivation, Goal, Impact

- Startup Divaneering created Spundle: Wig and Weave Dryer to optimize wig dryers for salons
- Motivation
- Support Divaneering Lab's mission to bring culturally conscious beauty tech to market
- Divaneering's initial prototype is large, requires manual user input, and can only support one of its two airflow channels used to dry the wig at a time
- Goals
- Redesign Spundle to be smaller, faster, lighter, quieter, and user-friendly
- Impacts
- Save time and reduce physical strain for salon professionals

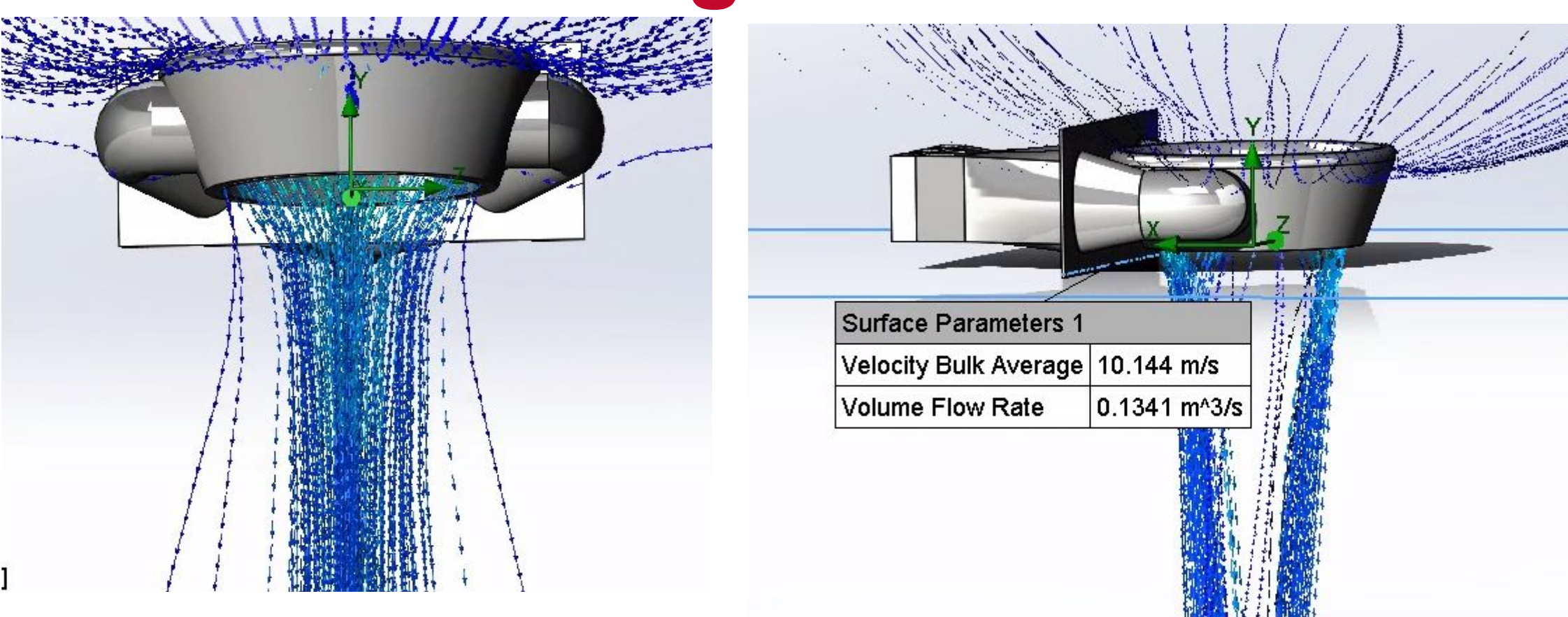
### Requirements

- Dries wig in 30 minutes or less
- Can operate both airflow modes, the post and halo, simultaneously
- Airflow sources must fit within the encasement
- Limited to dimensions: 42"x12"x23"
- Must weigh less than 70 lbs
- Heatless
- Disposes water out of the system
- User-friendly experience simplifies input needed to operate device
- Maximum sound output of 66 dB

### Final Design

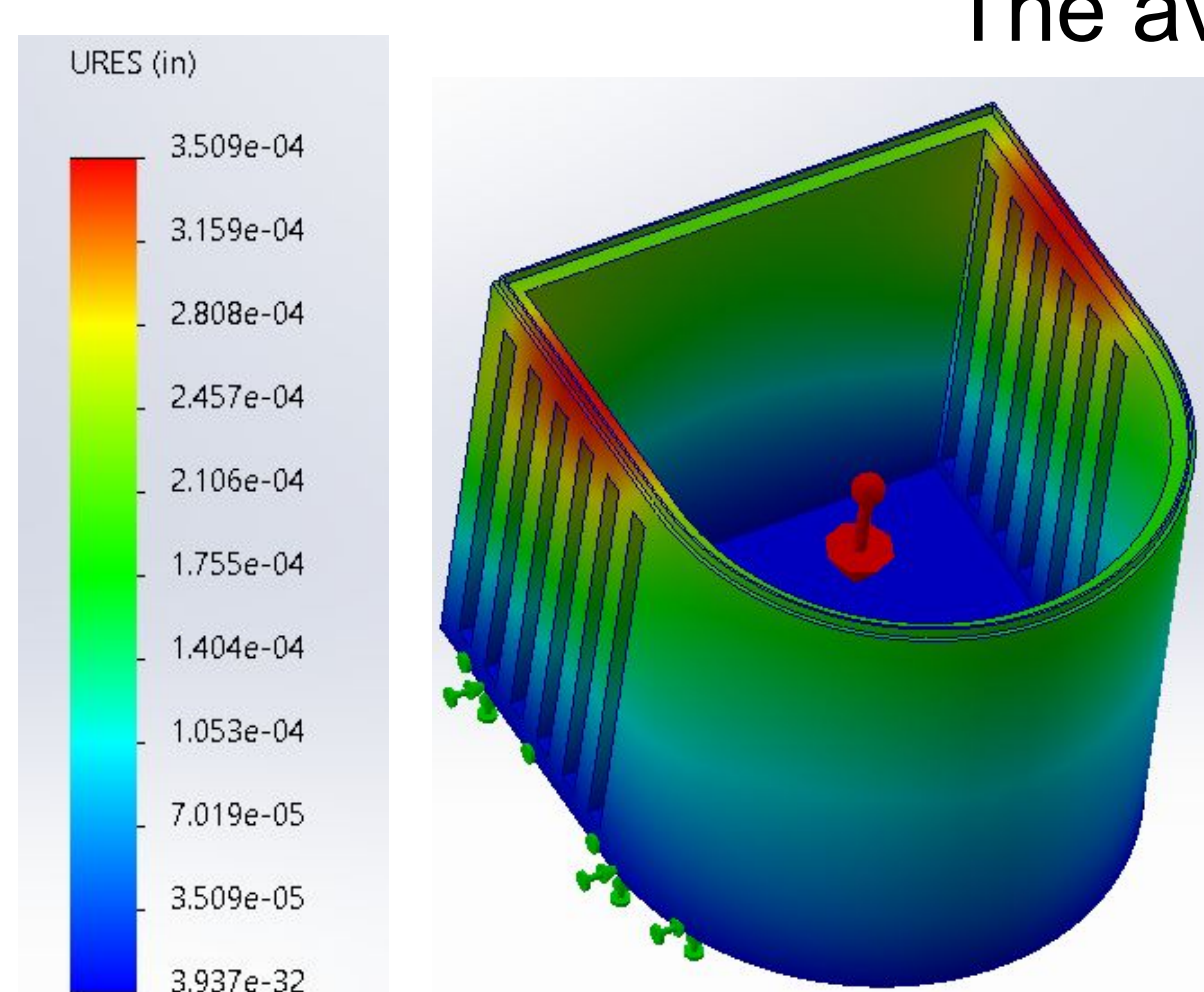


### Design Calculations & Decisions



Halo geometry was optimized using CFD modeling to maximize airflow output and improve air distribution. Based on those results, our design would increase the output volume flow rate by 2.5x relative to the input by utilizing the process of entrainment and inducement. The input volume flow rate is 110 CFM and the output rate is 280 CFM.

The average velocity is 10 m/s.



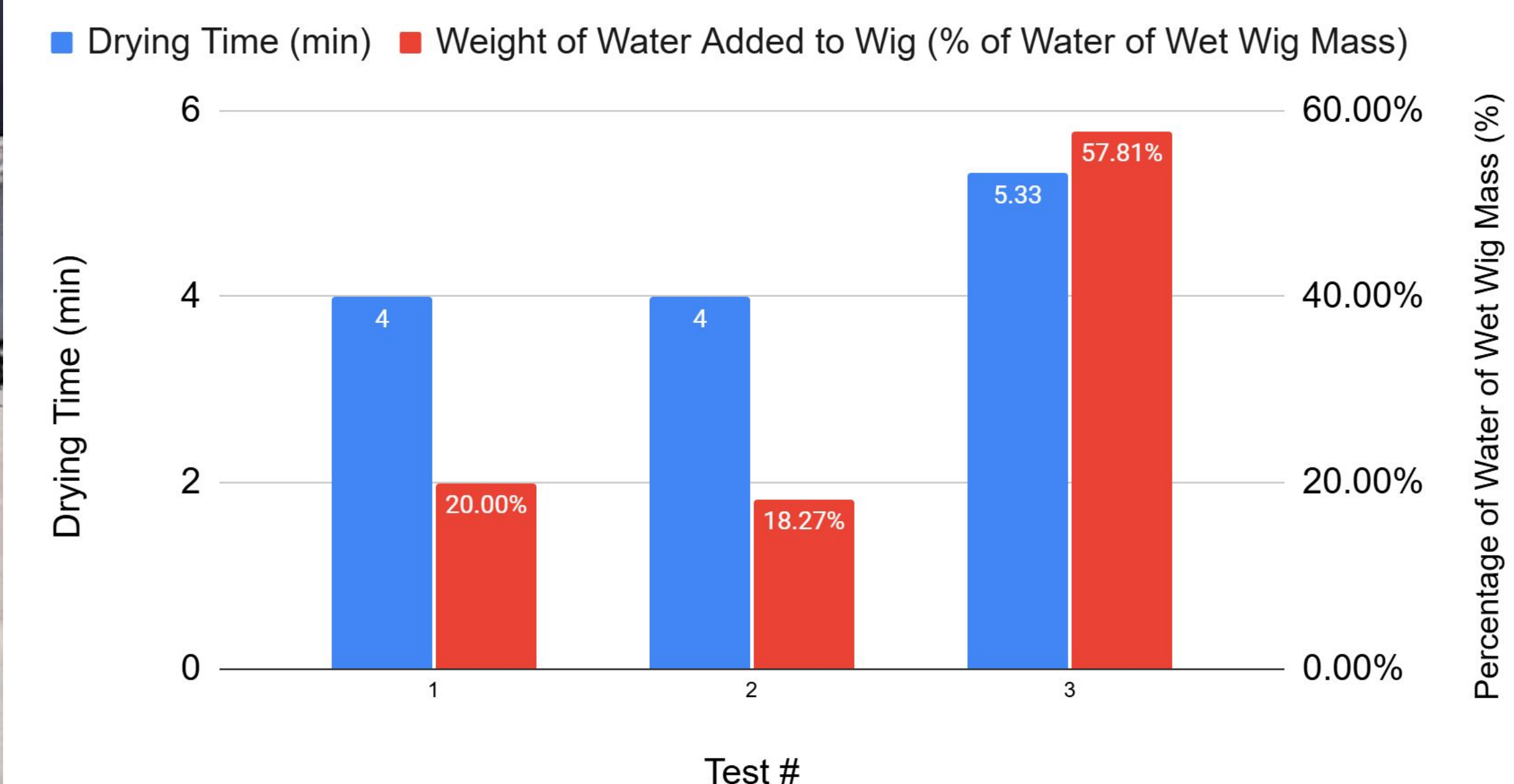
FEA was performed on the encasement to determine potential modes of failure

We calculated the minimum torque required for the lead screw in the linear actuator system, given the weight of the Halo ( $F_L$ ) and the screw's efficiency ( $\eta$ ).

### Prototype & Test Results



#### Drying Time and Weight of Water for Each Test



We tested how long it would take for the Post to dry the cap of a wig. It took an average of 4.44 minutes to dry. We also found that the higher the percentage of the weight of the wet wig is water, the longer a wig cap will take to dry.