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Media Mixing Apparatus

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Media Mixing Apparatus

Project 516 | **Team Members:** Nick Colt, Eric Depew, Kurt Thoele, Chris Ward | **Faculty Adviser:** Dr. John Speich |
Sponsor: Newport News Shipbuilding | **Sponsor Advisers:** Rob Heisler, Richard Hillyer, Jeff Hogge, Allen Valencia, Rose Yankoski

Design Process

Objective:

Design a system capable of agitating/mixing the resin media/water slurry in the funnel ensuring a homogeneous mixture is maintained while loading the resin into a container.

Requirements & Constraints:

- Mix $1/3 \text{ ft}^3$ of resin with 1-1/3 gallons of water in the funnel
- Space constraint: 15.5" H x 20" L x 20" W
- No pinch points
- Resin/water mixture must remain homogeneous until volume is drained
- No RCRA hazardous materials (Brass, bronze, etc.)
- Total weight < 50 lbs.

Paddle Design:

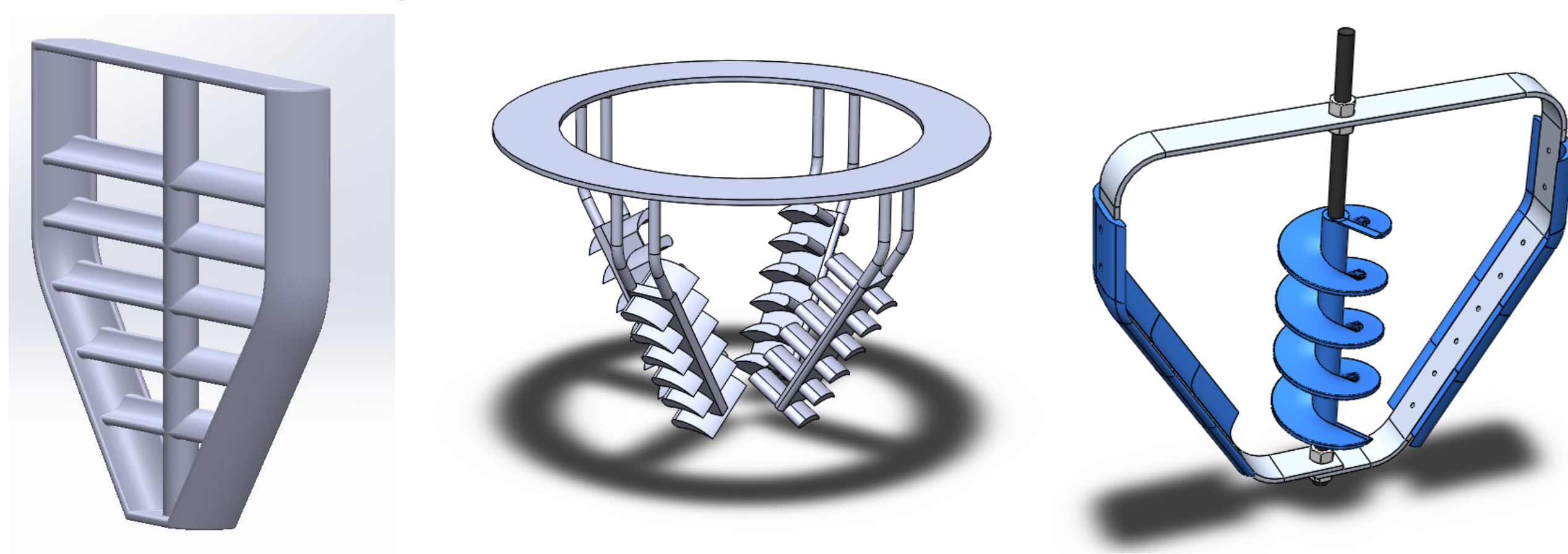


Figure 1: Initial paddle considerations

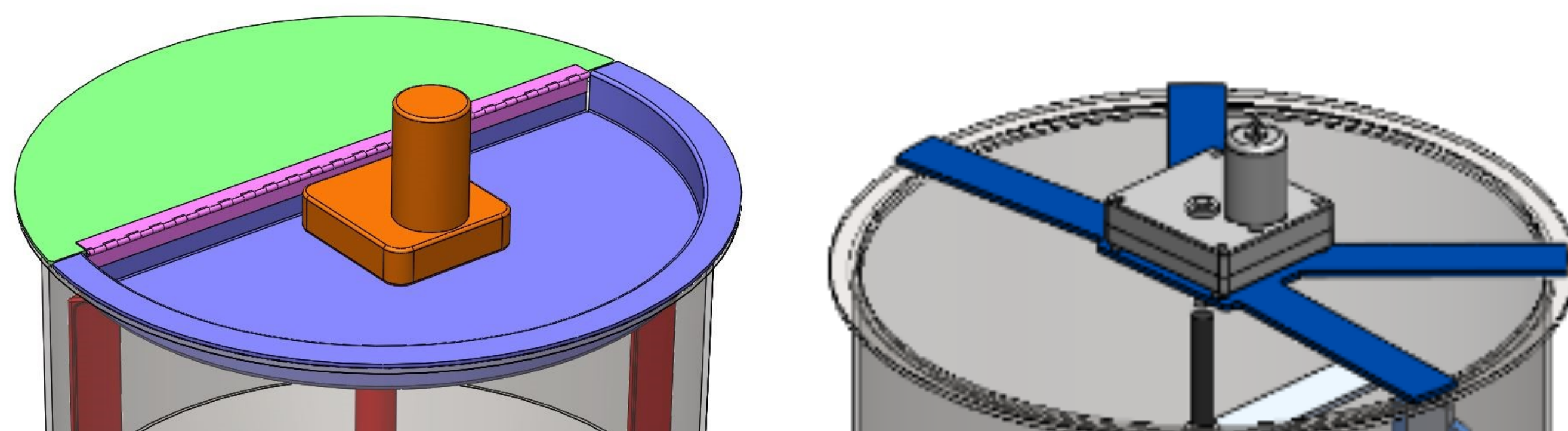


Figure 2: Initial motor mount considerations

Research and Analysis

Research:

- The main focus of this project was to achieve uniform mixing without compromising individual resin beads.
- Multiple paddle designs and motor mounts were considered.
- Initial designs were based off of the traditional kitchen mixer, optimized specifically for smooth mixing on a much larger scale.

Paddle Flow Analysis:

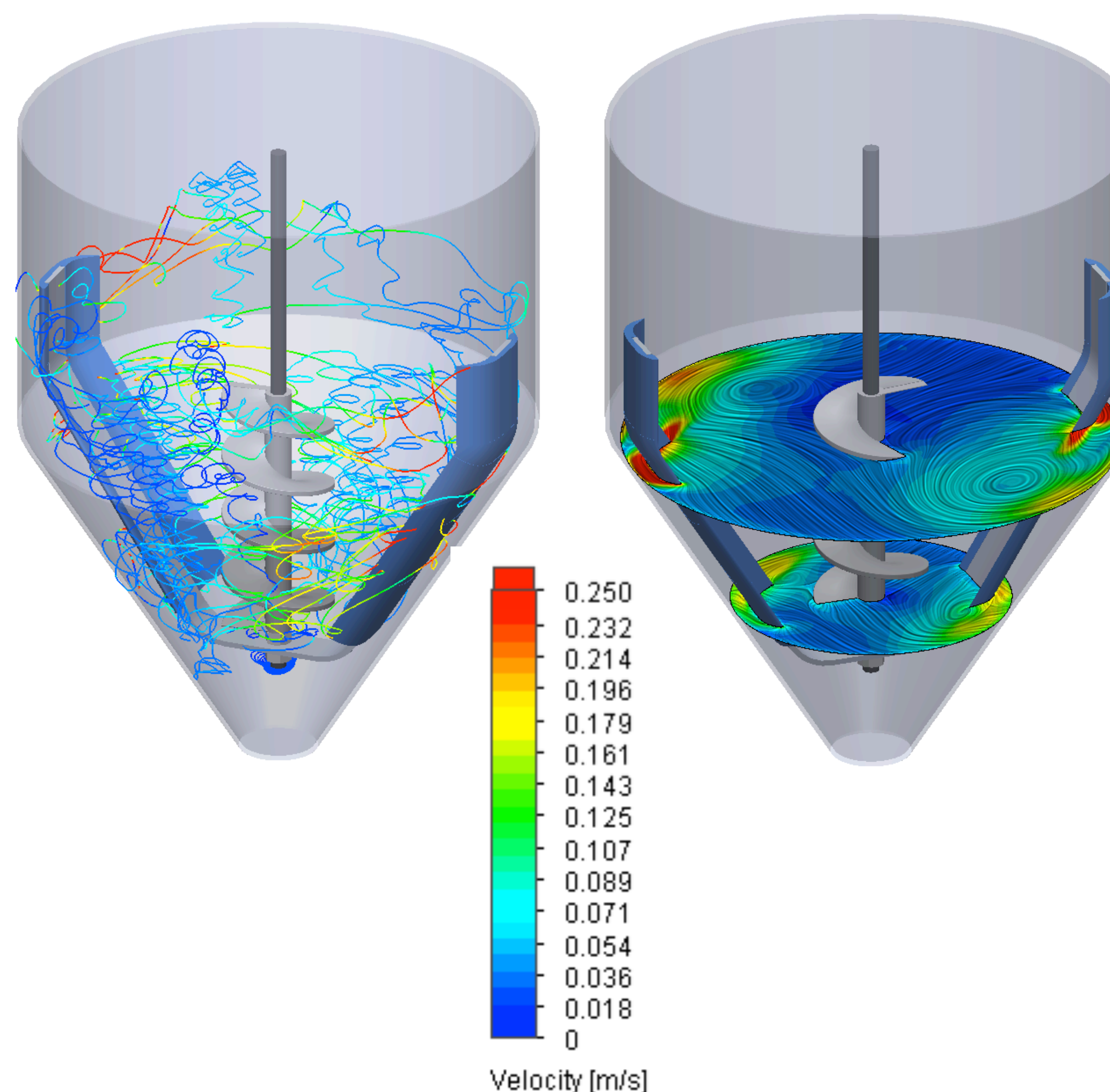


Figure 3: Results from computational fluid dynamics analysis inside funnel

Final Design

Paddle Design:

The final paddle design contains turbine-like blades on the outer edges and an auger in the center to ensure uniform mixing. The outer turbine blades also create a vortex to reduce burping during the slurry discharge into a container.

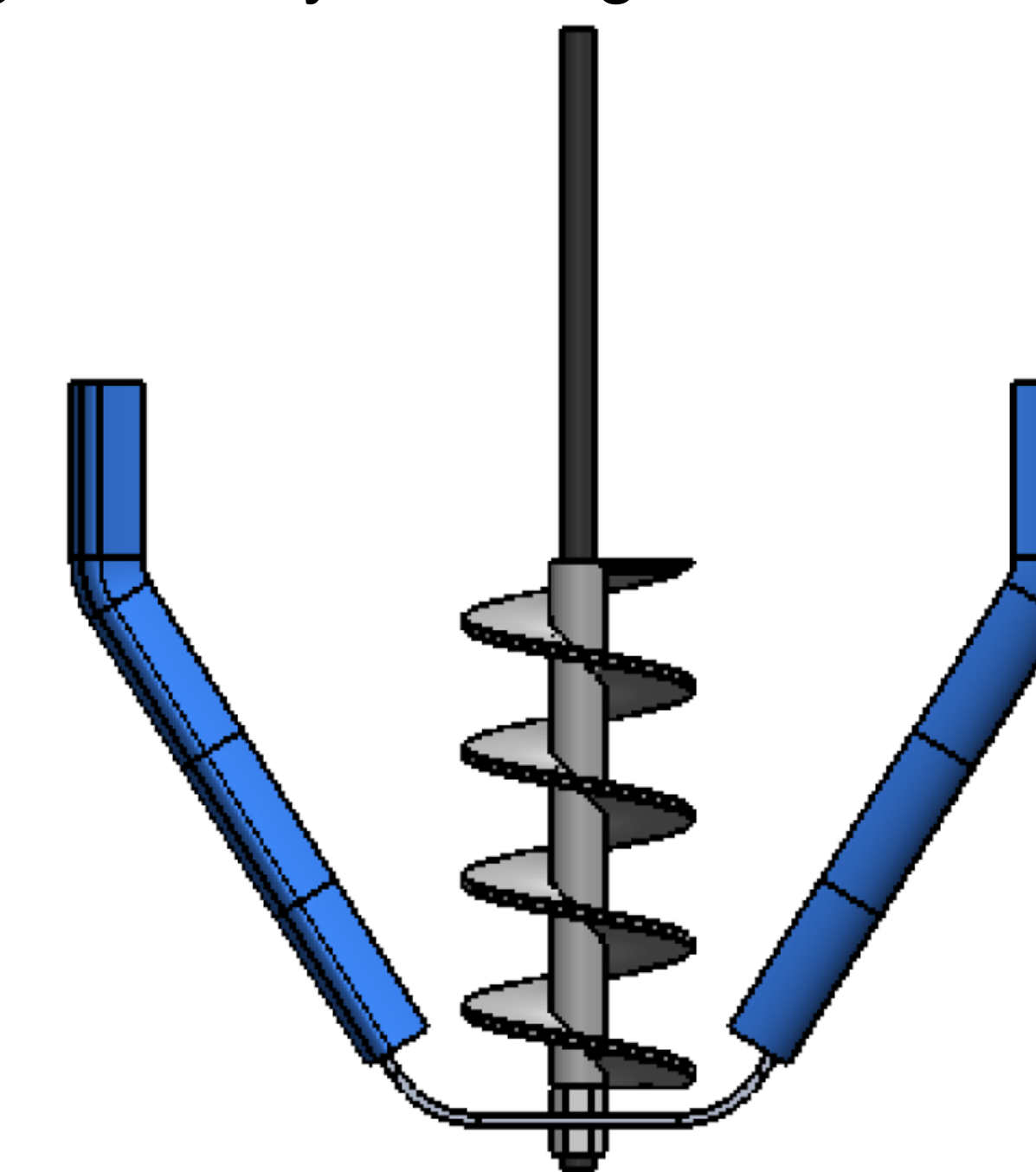


Figure 4: Current mixing paddle design

Motor Mount:

The current design for mounting the motor takes into account much more than simply ensuring the motor is stabilized. This mount design protects the motor from direct contact with resin and water while also providing sufficient air for cooling. The hopper feature allows for easier and cleaner loading when adding the slurry into the funnel.

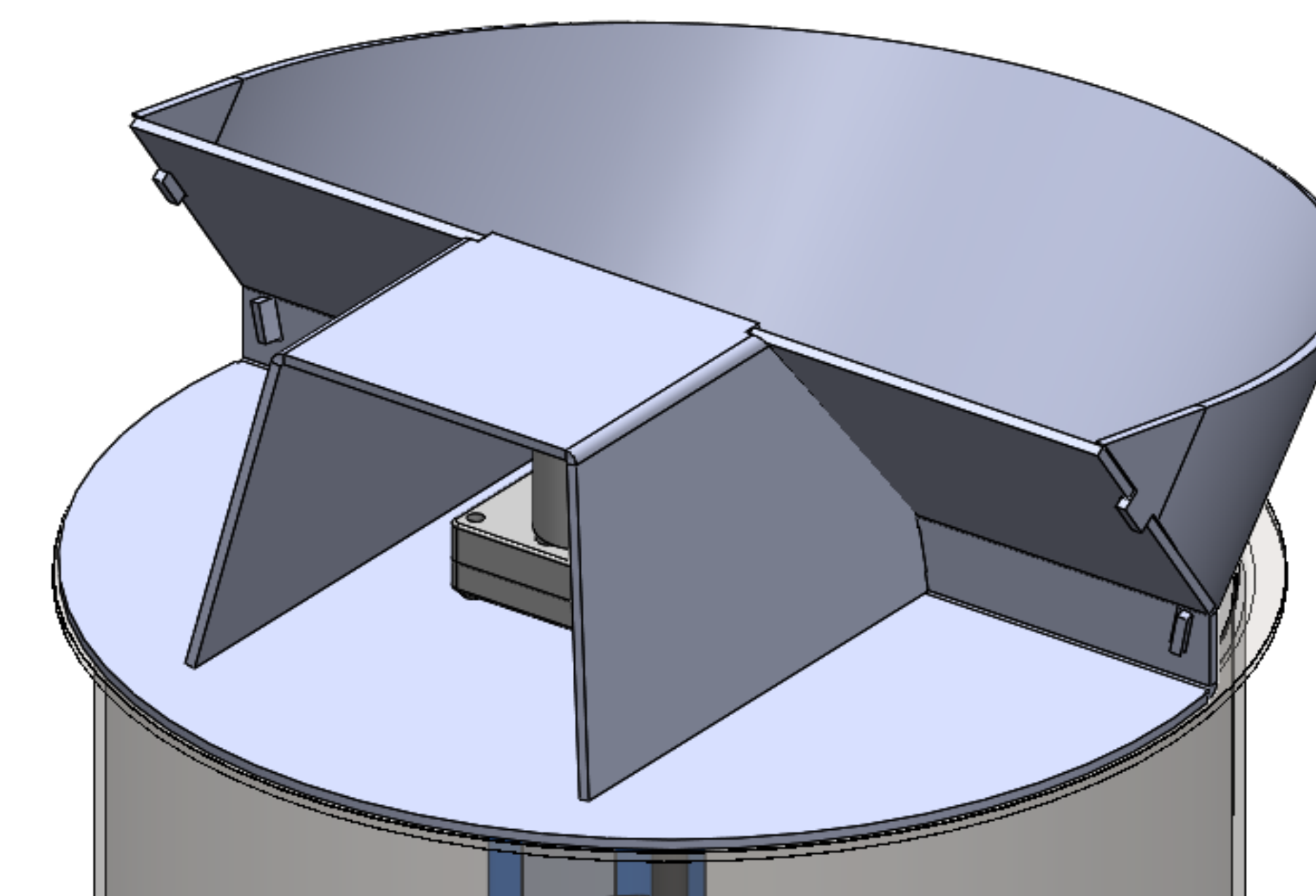


Figure 5: Current motor mount/hopper design

