



Dog Grooming tool

TEAM 17

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SPONSOR: ENGINEERING TO GO

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Background

A dog's fur is prone to matting or tangling

Textures and characteristic of the coat vary by dog's size and breed

- Short Hair dogs
- Long hair dogs

Grooming issues

- Takes too long
- Tools not ergonomic
- Unpleasant for dogs and groomers

Provide a solution for unpleasant grooming experiences of dogs and caregivers



Background Research

Some rotary brush hardware does exist

No grooming tools with removable rotating heads on the market

Things to consider with a rotary style brush

- Will brush head run risk of getting tangled and twisted into dogs hair?
- Will spinning brush pull too hard and injure dog?



Rotary Head Hair Dryer



Rotary Head Grill Brush

Voice of the Customer

- Taken during early parts of design project
 - Online Survey
 - Dog Groomer Shadowing
 - One on one Interviews with pet owners
- Used to refined Need Statement and Goal Statement
- Revealed current issues with dog grooming and the need for a better solution
- Maintained through consistent contact with potential customers and other established contacts

Need Statement

“De-matting a dog's hair can be an unpleasant experience for both the dog and the groomer, especially if the matting has advanced and is deep in the hair or fur. To de-matt or de-tangle, it can be very time consuming and uncomfortable, if not painful.”

Revised Goal Statement

Design and develop a grooming tool that provides both the user and dog with a pleasant, stress free, time efficient grooming experience

Objectives vs. Constraints

Objectives

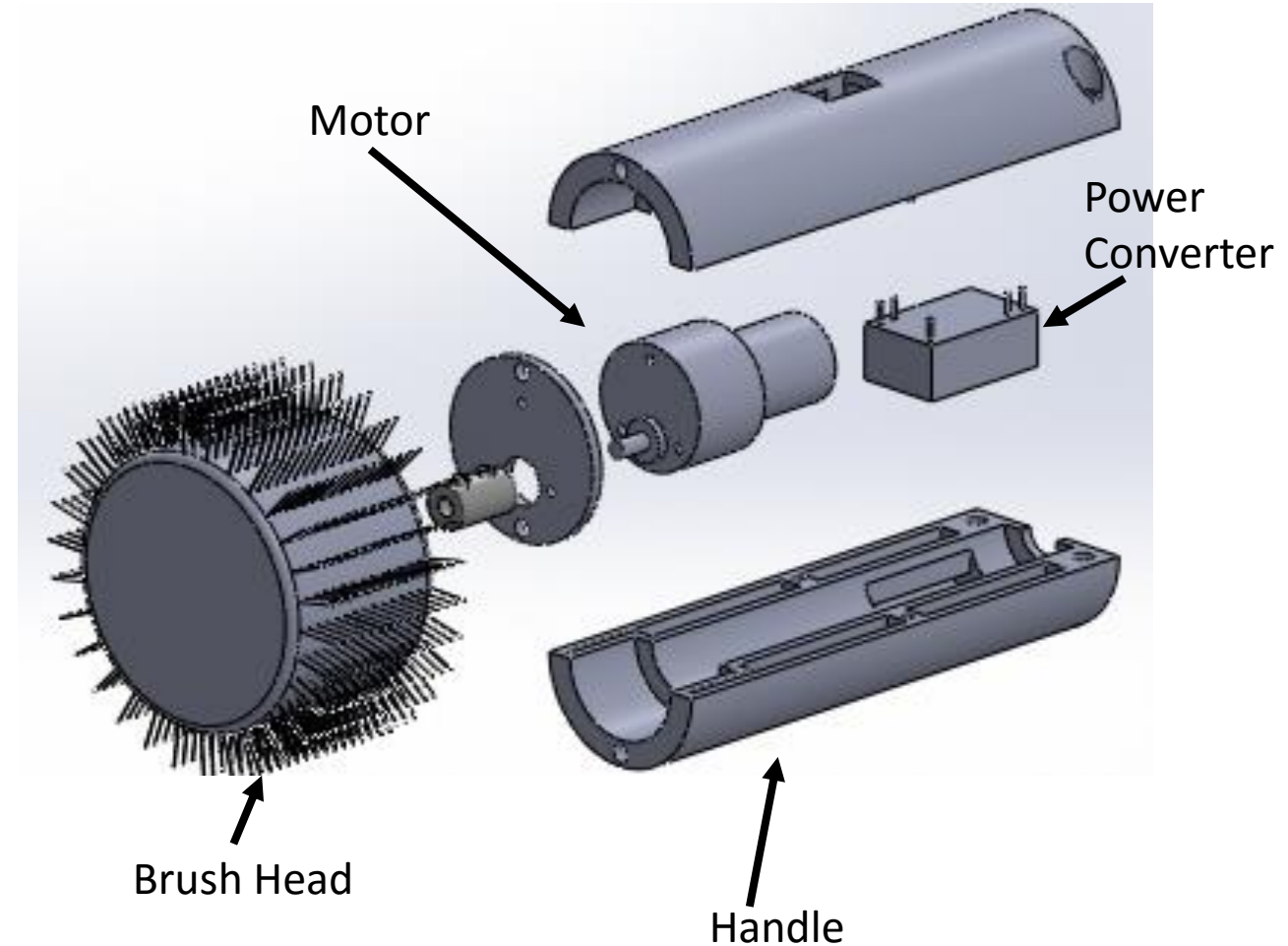
- Design tool for use by consumers, groomers, and rescuers
- Untangle pet's hair without harm to pet
- Develop tool that is stress free on dog and groomer

Constraints

- Tool is handheld and ergonomic
- Tool works at low RPM to prevent further entanglement and injury
- Tool is easy to clean and sterilize
- Battery last at least 2 hours at 50% duty cycle
- Total weight is 1 pound or lower

Final Prototype Design

- Simple handle design to be 3D printed out of ABS plastic
- Uses a 12V DC gearmotor spinning at 72 RPM
- Power is transferred through a small AC to DC converter and a simple on/off switch
- The brush bristles are .01" 304 stainless wire
- This design should be compact, lightweight, and easy to use



Procurement

Motors

- Ordered 4 DC Motors that fit performance specs
- Vary in length and diameter
- Status: Arrived

Handles

- Design sent out to be 3D printed
- Status: Complete

Switch

- Ordered one flip switch
- Status: Arrived

Power Source

- Status: Purchased

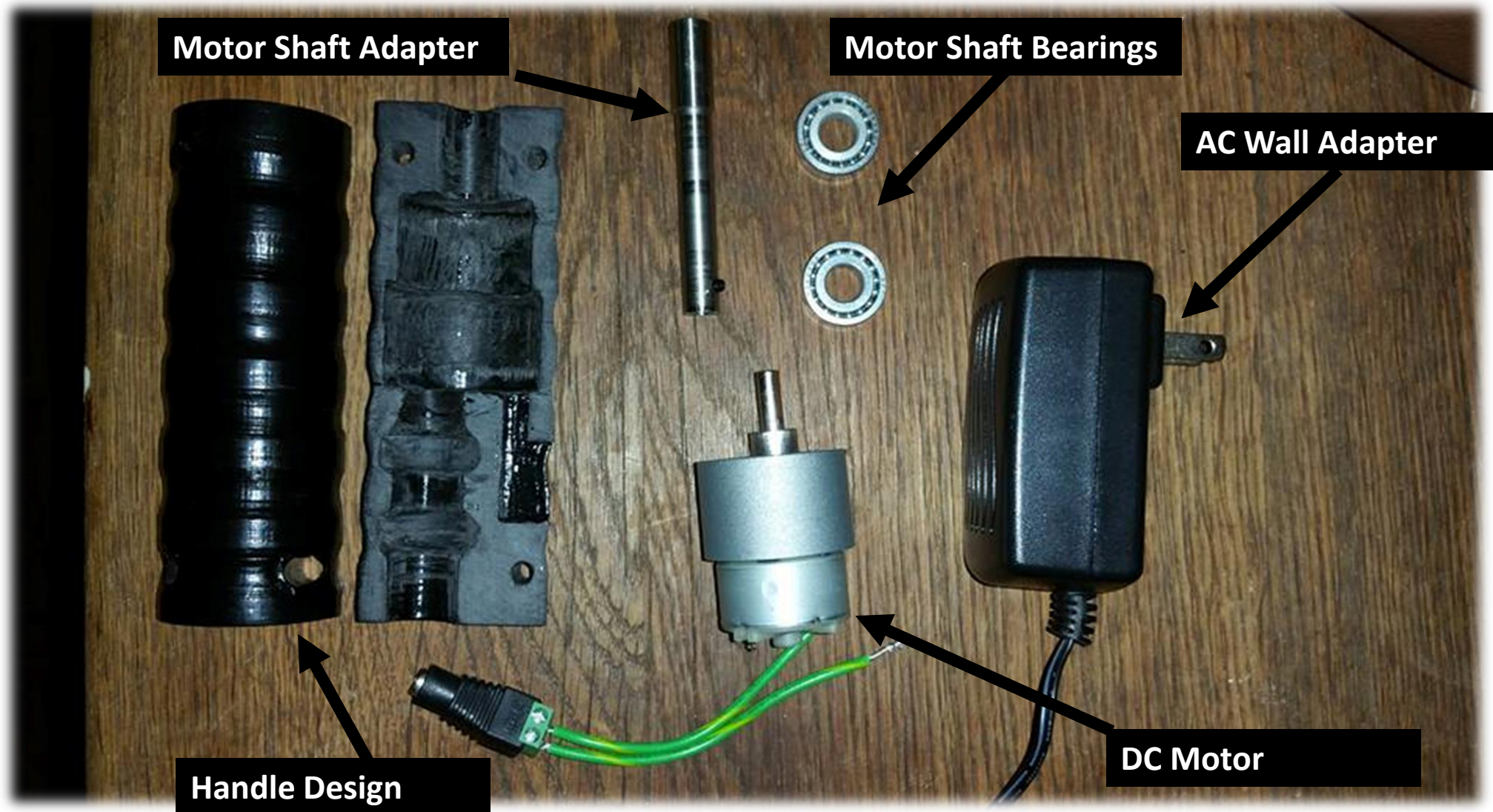
Bearings

- Status: Purchased

Power Converter

- Spec'd out and ordered
- Status: Arrived

Procurement



Current Budget

Total Budget Allocated

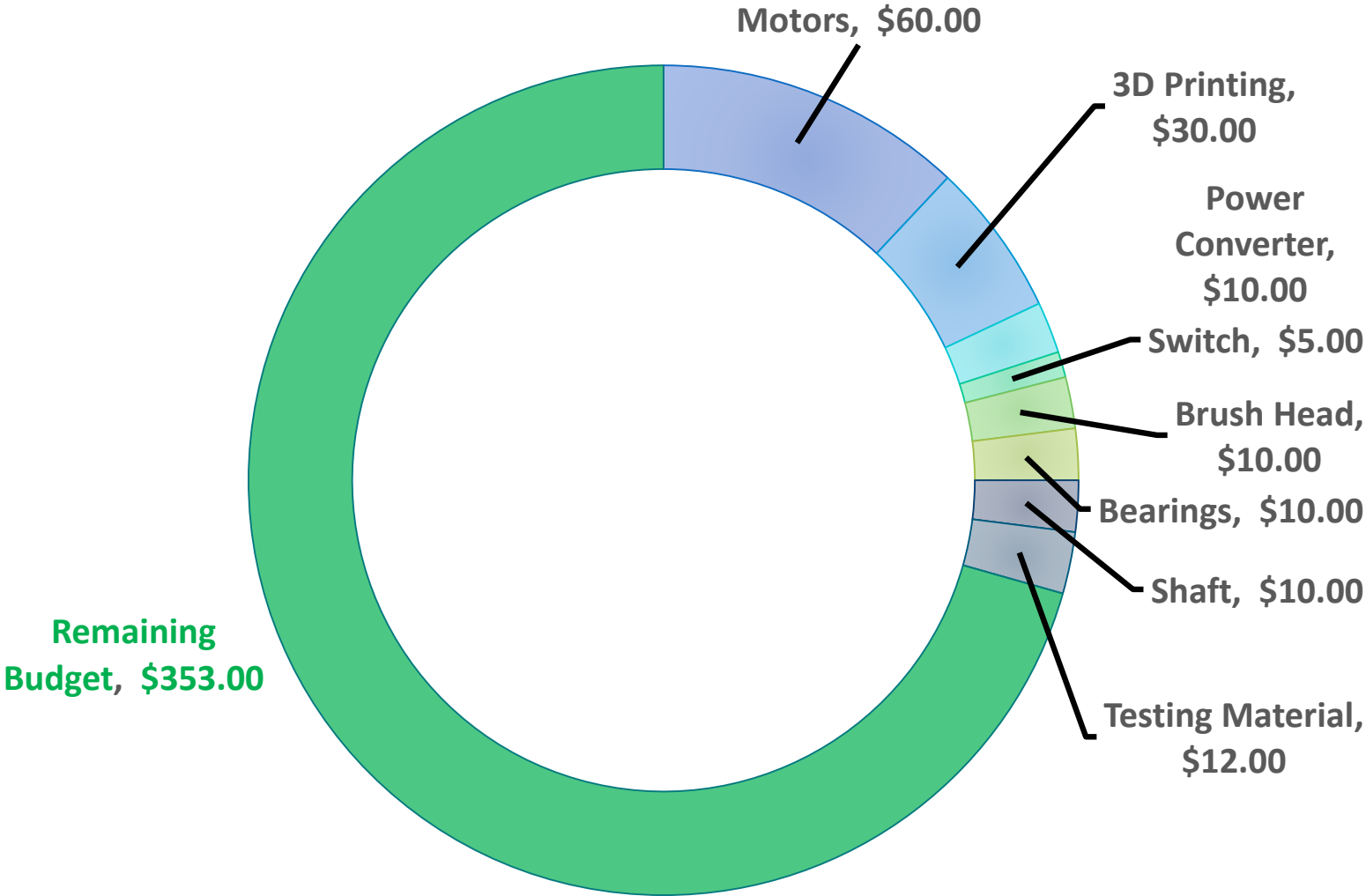
- \$500.00

Amount Spent

- \$147.00

Remaining Amount

- \$353.00



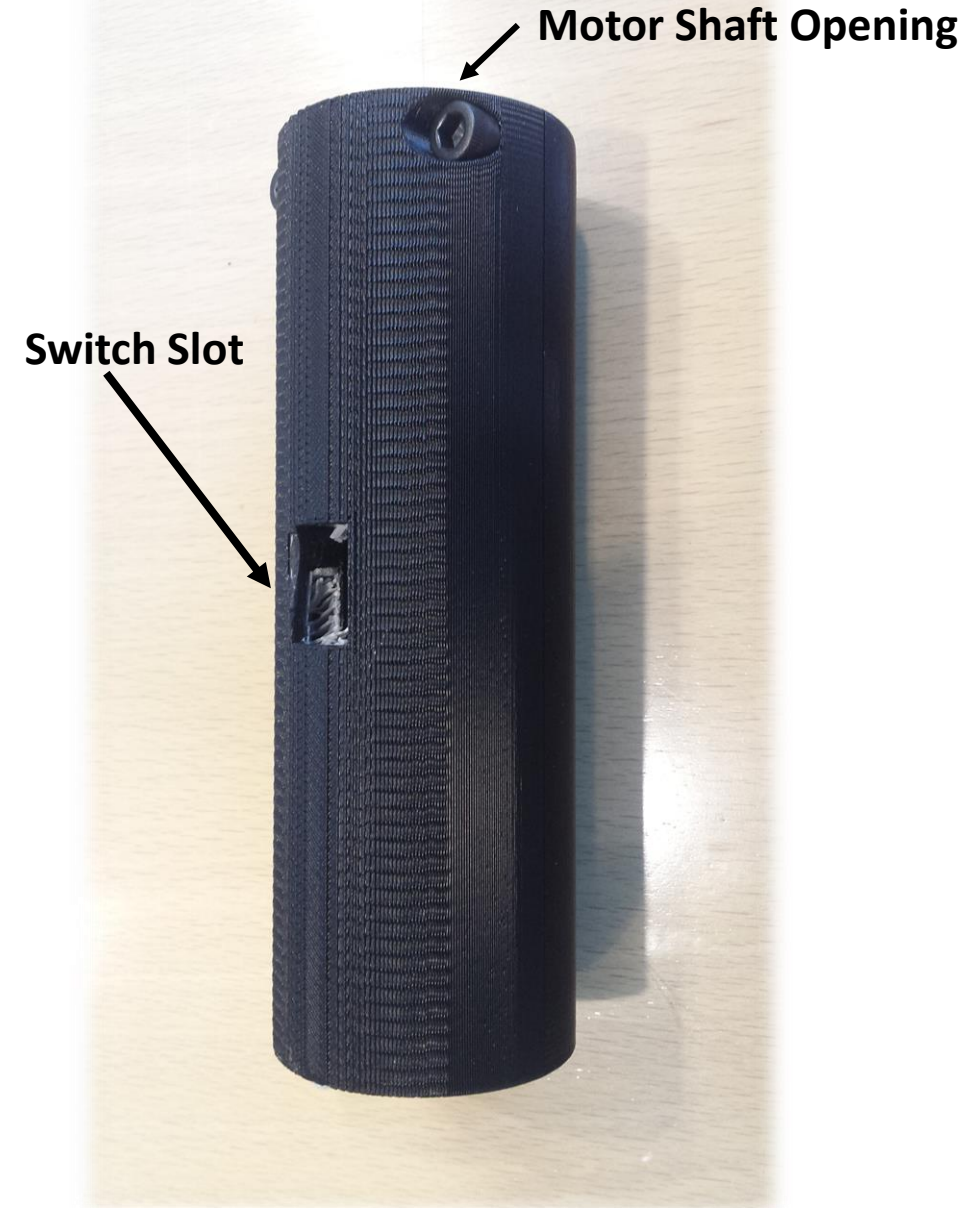
Testing: Force Required



Testing: Handle Ergonomics

Handle Design One

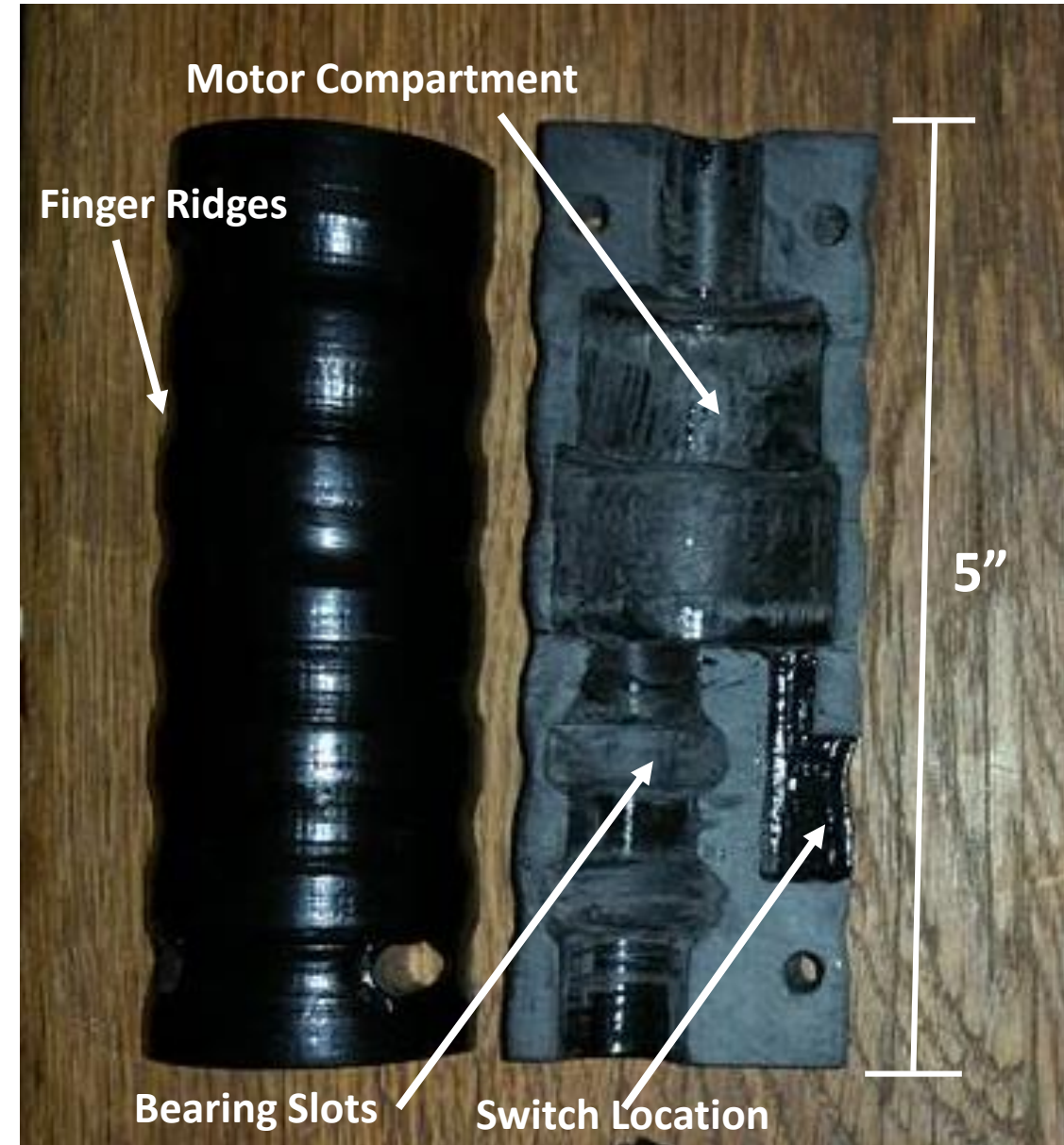
- 3D printed
- Designed with internal components in mind
 - Electrical components successfully housed
- Large diameter
- Uncomfortable to hold
- Weak grip



Testing: Handle Ergonomics

Handle Design Two

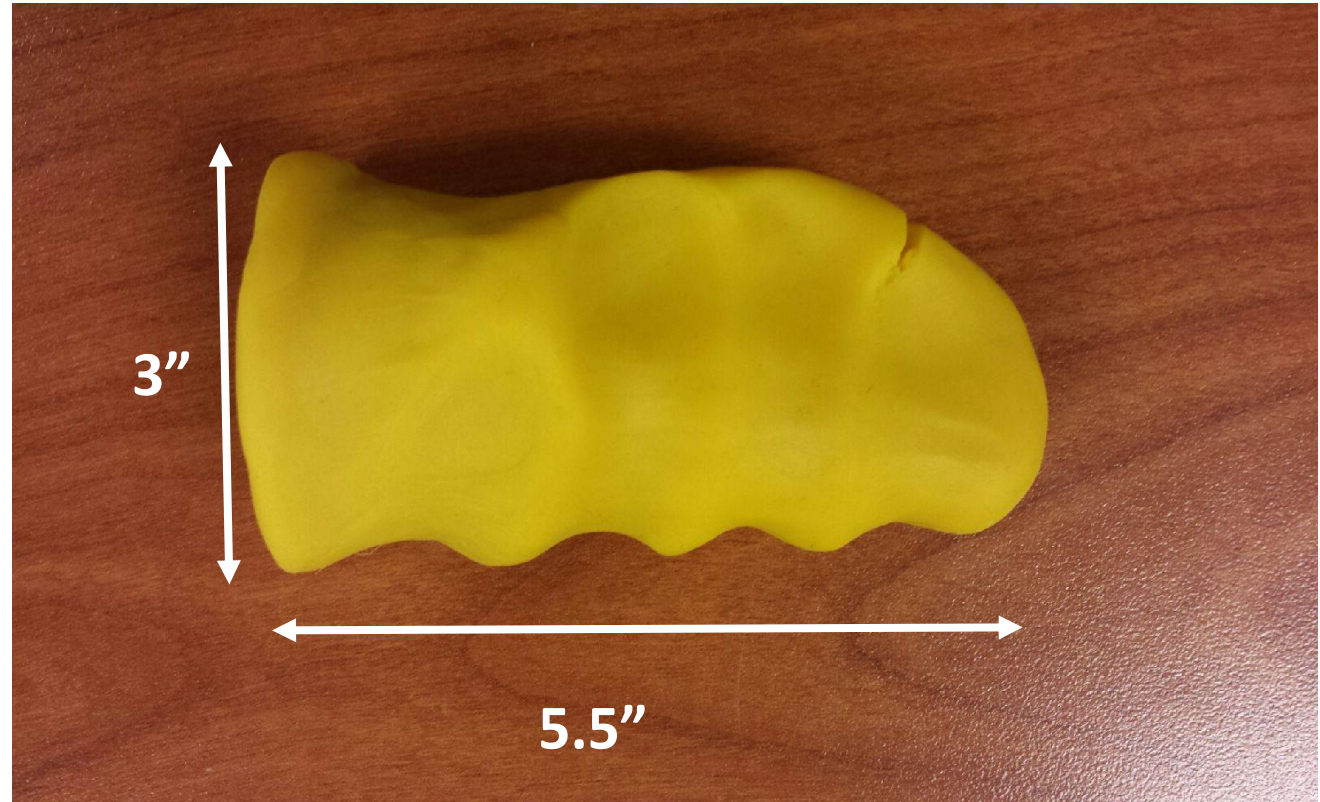
- 3D printed
- Designed with internal components and user comfort in mind
 - All electrical components successfully housed
- Smaller diameter but still large
- Comfortable to hold with finger grooves
- Weak grip



Testing: Handle Ergonomics

Handle Design Three

- 3D printed
- Designed with user comfort in mind
 - Oval shaped
- Designed as external covering for handle
 - Rubber sleeve



Current Design Adjustments

Brush Head

- Longer haired dogs will require large diameter to prevent fur from tangling

Handle

- Needs to be large enough to house all component and small enough to easily hold
- Needs to provide balanced weight distribution
- Needs a sturdier grip

Future Work: Testing

Motor:

- Test the output torque
- Determine output needs to be stepped up or down
- Test angular speed on simulated dog fur, test for tangling

Converter

- Ensure that converter operates as needed
- Power is effectively converted as desired

Brush Head

- Determine optimal bristle length and head diameter for various dog coat types and length
- Test for effects of bristle contact with skin

Future Work: Testing

Handle

- Test for grip comfort
 - Handle Diameter
 - Handle Sleeve
- Test sealing and water resistance

Switch

- Evaluate ease with powering on and off the brush

Bearing and Shaft

- Bending force analysis
- FEA simulation
- Evaluate any slippage between adapting shaft and motor shaft

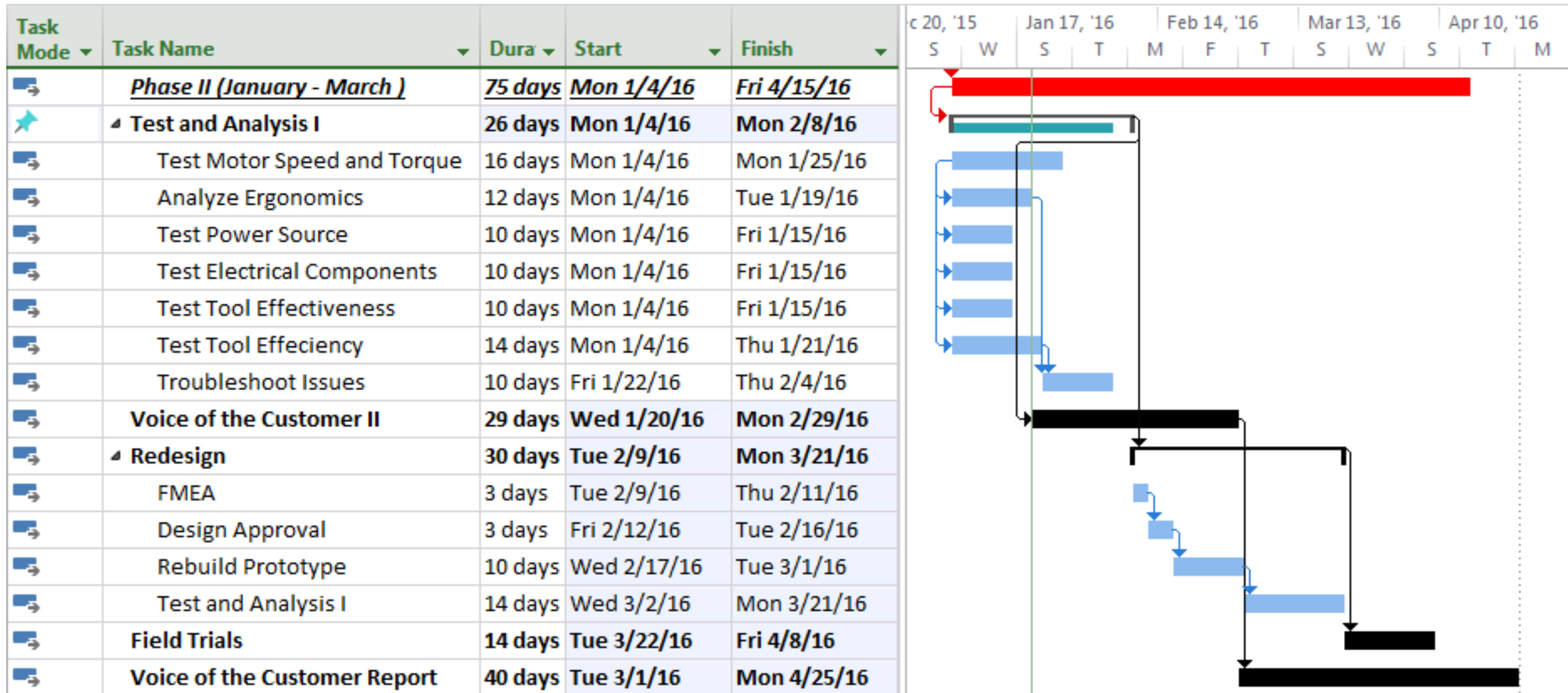
Future Work: Redesign & Fabrication

- Redesign and update current designs according to results of test
- Fabricate external handle covering
- Construct clay models of handle

Future Work: Field Trials and Finalizations

- Assemble final prototype
- Distribute to selected groomers and dog owners for trials
- Gather feedback on performance from trials
 - Likes and Dislikes
 - Areas for improvement
- Research additional methods for dog grooming

Product Gantt Chart: Phase II



Conclusion

- Prototype Design has been selected and approved
- CAD drawings have been finalized
- All parts have been ordered and received
- Brush head design to be tested and improved
- Product component testing will continue
- Grooming tool handle will be improved in ergonomics and purpose
- Testing results and data to be reported and used to improve product

Questions?