

Fume Master Product Proposal

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The Fume Master is a proposed portable range hood designed to address the challenges of stovetop cooking in apartments. It is made of aluminum to provide heat resistance and features a toroidal fan to reduce noise, making it a competitive alternative to the existing Air Hood. Through extensive market research and careful consideration of the unique needs of home cooks, the Fume Master aims to offer a superior product in terms of both functionality and affordability. All components for the Fume Master are sourced from suppliers found on Alibaba.com, and the final product will be manufactured in China by Zhongshan Greentec Electric Appliance Co.Ltd. This strategy keeps production and shipping costs low, with a total manufacturing cost of \$77.09 per unit. The Fume Master will be retailed at \$149.99, offering customers a better-quality product at a lower price than its competitor, the Air Hood, which is priced at \$156.99. The Fume Master's innovative design, cost-effective manufacturing process, and competitive retail price position it as a promising new option for those seeking a portable range hood for apartment living.

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Introduction

Frying on a stovetop is a common form of cooking, but it creates a lot of smoke, fumes and aerosolized grease. This is usually solved with a range hood. This pulls the air through filters, cleaning the air. The trouble is that range hoods cost as much as \$500, but this cost doesn't include the installation cost. Installation can cost as much as \$800 to replace an existing unit, and as much as \$2000 for a new installation. (HomeGuide 2023).

To further complicate matters, many people live in apartments where installations like a range hood must be reversible. Given that stove tops often have tiled walls that require destructive modification to enable a range hood to be installed, that apartment requirement becomes a problem.

A new solution already exists on the market, which is the Air Hood™. This product is cheap at \$156.99 and portable, which allows it to primarily address the challenges of stovetop cooking in an apartment. This product has a few problems. It is noisy because it is relatively small, and so requires a high fan speed. Another issue is that the Air Hood™ is made of plastic, which is at risk of melting if it is used on a gas stovetop.

The Fume Master is a proposal for a portable range hood that addresses these problems. It is made with aluminum to resist the heat from the stove, it has a toroidal fan to reduce noise, and it is also cheap at \$149.99. This proposal includes drawings of the product and its parts, an analysis of the costs, market research, and a technical description of the product.

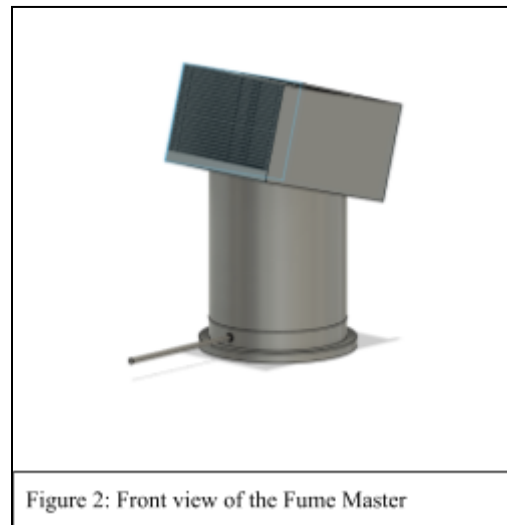
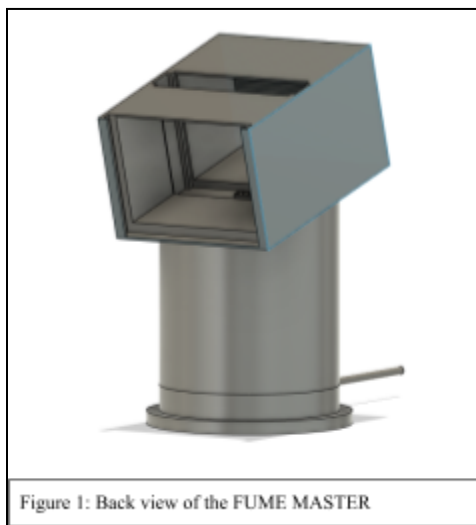
Proposed Program

List of Parts and Subparts

1. Outer shell
 - a. Bottom frame
 - b. Top frame
 - c. Rubber base
2. Charcoal filter
3. Fan Assembly
4. Electrical cable

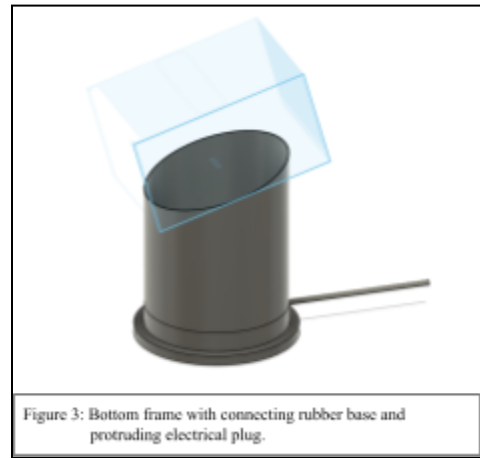
Outer shell

The outer shell can be differentiated into two parts, the top frame and the bottom frame, where each is made of heat-resistant aluminum that is 24 gauge or 0.64 mm thick. The shell will hold the electrical wiring and motor that will power the exhaust fan inside the top frame. The outer shell can come in many colors ranging from red, green, blue, etc.



Bottom Frame

The bottom frame consists of an aluminum cylinder with a diameter of 7 inches and 13 inches in height. The bottom frame will be hollow with a motherboard and connecting electrical wiring that extends out to create an electrical plug outside the frame. The motherboard in the interior bottom frame is approximately 7 by 5 inches in length. On the sides of the bottom frame are 3 protruding buttons that can change the fan speed from 3 settings. The top of the cylinder is welded together to the top frame.

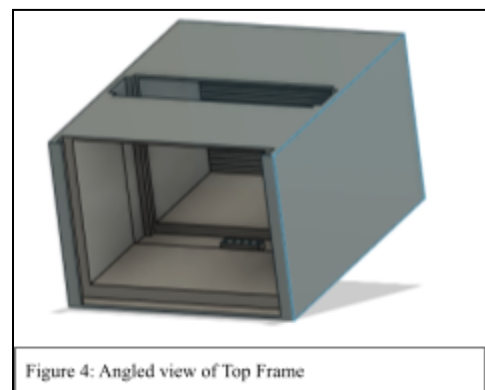


Weighted rubber base

At the bottom of the bottom frame is a weighted black rubber piece that covers the entire surface of the bottom frame. The base is 8 inches in diameter and 0.5 inches in height. It also weighs 5 pounds to ensure the stability of the range hood. The rubber is fixed to the bottom base through an adhesive.

Top frame

The top frame is a rectangular cube that is 9 by 5 by 7 inches long and sits on top of the bottom frame at a 16-degree incline. The top frame is made with the same type of aluminum as the bottom frame. The top frame holds the exhaust fan and the charcoal filters which are both removable from the openings on top of the



rectangular cube. At the base of the rectangular cube and where the fan sits is a 5-pin connector that hooks up to the electrical supply in the bottom frame to power the fan. At the top of the incline, the top frame has a series of metal baffles built into the structure that is 0.1 by 0.1 by 6.8 inches long.

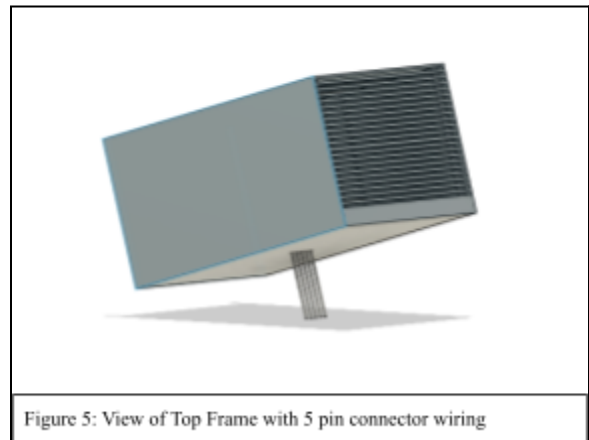


Figure 5: View of Top Frame with 5 pin connector wiring

Fan Assembly

The fan used is going to be a variation of the toroidal propellor design where the fan blades are curved into each other, unlike the typical fan design where each blade sticks out individually. This design creates less noise because of the curved design which reduces the drag from the air tunnel created by the fan. The fan will have a 4.5-inch diameter which is then encased in a polyurethane plastic casing that will connect to the 5-pin connector inside of the top frame to supply the fan with power. The fan casing will have a circular platform in the middle that connects to the rotator of the fan which has 4 thin legs with wiring inside that connects to the exterior of the casing. It will also have a handle on the top for easy removal.

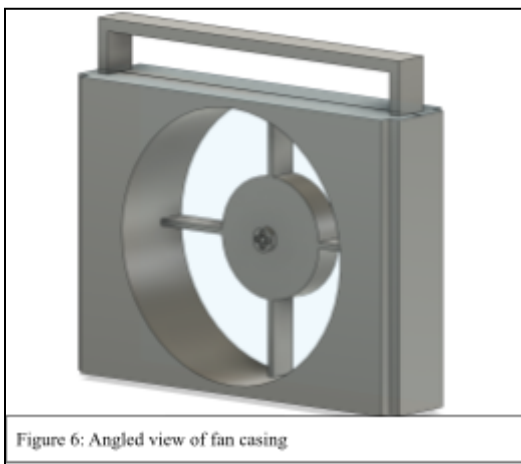


Figure 6: Angled view of fan casing

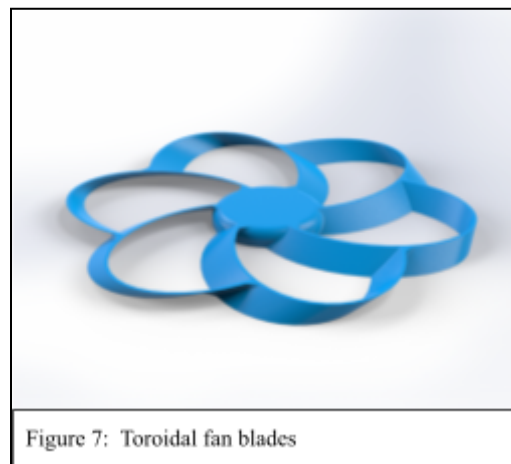


Figure 7: Toroidal fan blades

Activated charcoal filter

At the bottom of the incline of the top frame is a charcoal filter that can be slid in and out of an opening at the top of the frame. The filter will be able to remove most smoke and odor from the fumes that pass through. Each filter will be approximately 5 by 7 inches.

Electrical cable

At the base of the bottom frame, there is a 50-inch electrical plug that comes out from the exterior which will plug into an outlet. This electrical plug is connected to the internal electrical wiring that connects to a motherboard in the interior of the cylindrical bottom frame, the controls on the exterior of the bottom frame, and then connect to the 5-pin connector that hooks up to the fan.

Innovation Process

Extensive market research has been done to ensure our product provides a distinctive service to our customers. There was careful consideration of how the problems in the everyday home cook's life could be solved. Upon research, a similar product to the Fume Master was found, this product is the Airhood. With such direct competition already established, the Fume Master must fulfill a unique need in the market. For this reason, the Fume Master improves several problems with the Airhood which are fan noise and lack of heat resistance. To improve heat resistance, the Fume Master is primarily made out of aluminum rather than plastic. To reduce noise, the Fume Master incorporates a toroidal fan.

Research has been done to make the Fume Master as affordable as possible. Suppliers were selected based on who can provide the parts needed to manufacture our product at the lowest cost and highest quality. All suppliers were found via the website Alibaba.com. Since all suppliers for the Fume Master are overseas, supply costs are relatively low with the tradeoff of higher shipping. For this reason, all parts will be purchased in bulk quantities at discounted prices. All products will be shipped to the Chinese manufacturer Zhongshan Greentec Electric Appliance Co.Ltd. so shipping costs will remain low as all suppliers are also located in China.

There are 6 parts per unit: the top frame, bottom frame, rubber base, charcoal filter, electrical cable, and toroidal fan. For the top and bottom frames and rubber base, we will have to submit custom designs to these suppliers which may result in a higher price. Since the user will have to replace charcoal filters, we will select a filter that is affordable for the average user. We will also sell replacement charcoal filters, although the user can buy replacement filters from a 3rd party if they choose. For the toroidal fan, we were unable to find a supplier who sells our specific design. The design is simple enough that it could be 3D printed with ease using

Polytetrafluoroethylene (PTFE). For this reason, we have chosen a manufacturer with a 3D printer to manufacture the final product. The fan estimate does not factor in bulk pricing so the total cost may be cheaper. The prices for these parts can be found in the following table. These prices were taken directly from the website Alibaba and are just estimates.

Costs

Part	Supplier	Cost/ Unit	Bulk Quantity	Cost/2,000 units
Top Frame	Shenzhen Duo Li Duo Technology Co., Ltd.	\$20	2,000	\$40,000
Bottom Frame	Shenzhen Duo Li Duo Technology Co., Ltd.	\$20	2,000	\$40,000
Rubber Base	Qingdao Jianqing Rubber Product Co., Ltd.	\$10	100	\$20,000
Charcoal Filter	Nangong Mingding Auto Parts Co., Ltd.	\$1.80	2,000	\$3,600
Electrical Cable	Dongguan Hohao Wires & Cables Co., Ltd.	\$1.57	200	\$3,140
Toroidal Fan	Zhongshan Greentec Electric Appliance Co.Ltd.	\$10	2,000	\$20,000
Total Parts Cost	N/A	\$63.37	N/A	\$126,740
Manufacturing Costs	Zhongshan Greentec Electric Appliance Co.Ltd.	\$12.67	N/A	\$25,348
Shipping Costs	Zhongshan Greentec Electric Appliance Co.Ltd.	\$1.05	N/A	\$2,095
Total cost	N/A	\$77.09	N/A	\$154,183

The total cost for all parts is \$126,740 per 2,000 units or \$63.37 per unit. Additional costs must be considered, such as the manufacturing costs of the final product. Manufacturing of the product will be done in China with Zhongshan Greentec Electric Appliance Co.Ltd., a well-established manufacturer of kitchen appliances like range hoods and stovetops. Their experience, higher quality production line, and larger workforce will help with faster and quality production. They will be contracted to manufacture the final product and all parts will be shipped directly to them to save shipping costs. The estimated cost of all parts is \$63.37 making production of 2,000 units cost \$126,740. The manufacturer uses a Cost Reimbursement Model

that charges 20% for labor fees which in our case would be \$25,348 bringing the total cost to \$152,088 and \$76.04 per unit.

The manufacturer and suppliers are all located in China. This was done so that all parts could be efficiently and inexpensively shipped directly to the manufacturer. This limits the expensive cost of overseas shipping to only exist from the manufacturer directly to us. The most efficient shipping method is FCL freight shipping which is Full Container Load shipping. The estimated shipping time is 44 days. The total cost of shipping from Zhongshan, Guangdong to New York is \$2,095 making the cost per unit \$77.09.

A cost-per-unit of \$77.09 leaves us with the opportunity to set a wide profit margin. The price of our competition, the Airhood, is \$156.99. We believe that customers will be willing to pay a higher price for our product, since it is made out of a stronger heat-resistant material, and is much quieter than the Airhood. However, considering that the Airhood is already an established product with a positive reputation, we will sell our product at a lower price. We believe a retail price of \$149.99 to be a fair compromise that will make customers choose our product over the competition.

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Appendices

Evaluation Techniques

The goal of this product is to be both a successful portable hood, and address the weaknesses of the competition in the Air Hood™. To test whether the Fume Master is an effective portable hood, the appropriate test is to test the airflow and the amount of filtration. To test whether the Fume Master addresses the weaknesses of the competition, test the heat resistance and noise level.

To test the airflow, an airspeed sensor should be placed on the exhaust side of the Fume Master. This airflow has the potential to decrease with use, so an experiment should be run where the airflow is measured as smoky cooking is filtered through the hood. Boiling grease can serve as a suitable simulacrum for cooking.

To test the filtration, the weight of the filter should be weighed before and after cooking. The more effective the filtration, the more mass would be deposited on the filter. Some of the mass added to the filter would be steam, so there would need to be a cool-off time to let the water evaporate.

To test the heat resistance, the temperature at various places on the Fume Master should be measured during cooking. These places would be around places where the metal touches plastic and places a user is likely to bump into in use. Examples include the motor mount, the base of the cord, the top of the fan case, and the side of the base.

To measure noise, a noise meter should be placed near the Fume Master and across the room over the course of a smoky cooking session. As material is added to the filter, the noise level of the fan may change, so the noise level should be monitored throughout. This noise should also be compared to the noise of cooking at various levels.

Task Schedule

- 1- First prototype batch (July 2024-August 2024)
- 2- Evaluation (August 2024-September 2024)
- 3- Manufacturing (September 2024)
 - a. 1 month for part manufacturing (September 2024-October 2024)
 - b. 1 month for product assembly (October 2024-November 2024)
 - c. 44 days freight shipping (November 2024 - December 2024)
- 4- Marketing/Sales
 - a. Ad spaces on Social Media
 - i. 1 month to hire 3 graphics designers and 1 photographer. (November 2024 - December 2024)
 - ii. 1 week to take pictures of the product (December 2024- December 2024)
 - iii. 2 weeks for graphics designer (December 2024 - December 2024)
 - b. Sponsorship deals for influencers
 - i. 1 month for contact and contracts (November 2024 - December 2024)
 - ii. 1 month for Influencer ad reads (November 2024 - December 2024)