# Team 6: Design of a Less Deafening Hair Dryer

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## What's The Problem

### Hair dryers are TOO loud!

- Annoyance for users and surroundings
- Unwanted noise in grooming businesses
- Average hairdryer operates at 85 dB
- Noise induced hearing loss begins at 85 dB

## Project Background and Constraints

- The goal of this project is to design and build a prototype of a quieter hairdryer and produce a corresponding plan for commercialization.

- Project budget of $1500
- Max noise output less than 70 dB(A)
- Weigh less than 1.5 lbs
- Include required safety components
- Easily held and maneuvered
- Design for easy and mass manufacturability

## Basic Hairdryer Components

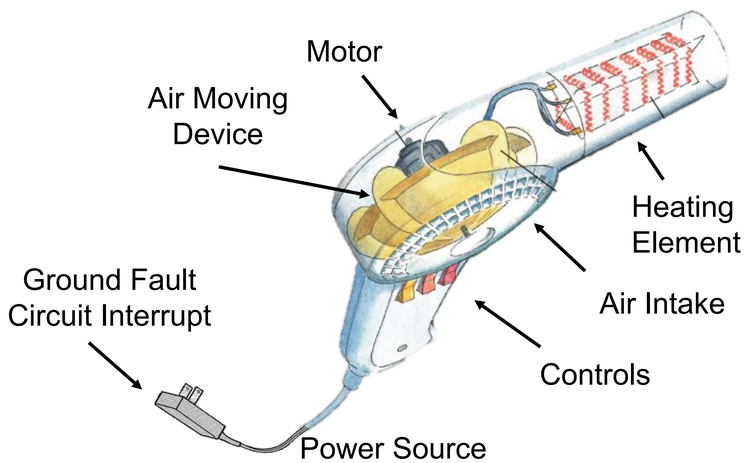



Fig. 1: Basic components of a simple hair dryer

## Background Research

### Methods to reduce noise

- Reduce flow impedances[2]
- Improve fan/blade performance[2]
- Interior acoustic treatment[1]
- Reduce fan speed[5]

### Reverse Engineering of Quiet Hair Dryer

- Centrix Quiet Q-Zone
  - Rubber vibration dampers between casing
  - Centrifugal fan design
  - Intake on both top and bottom
  - High setting ≈ 76 dB

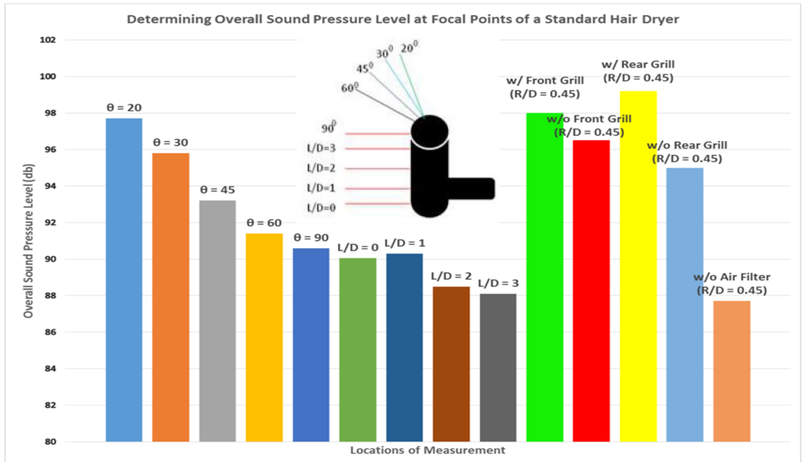
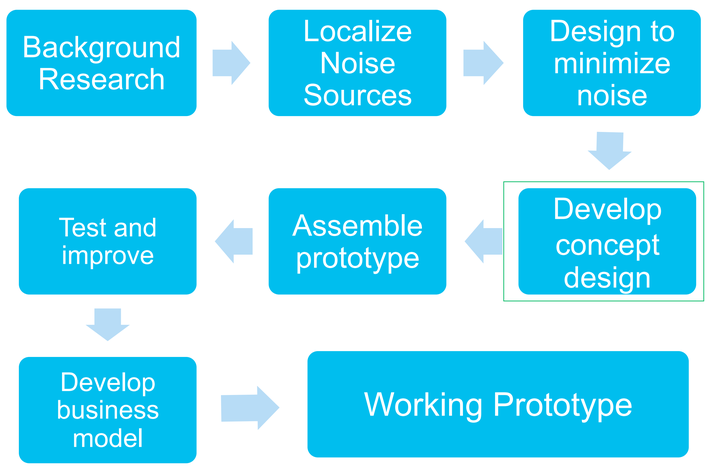
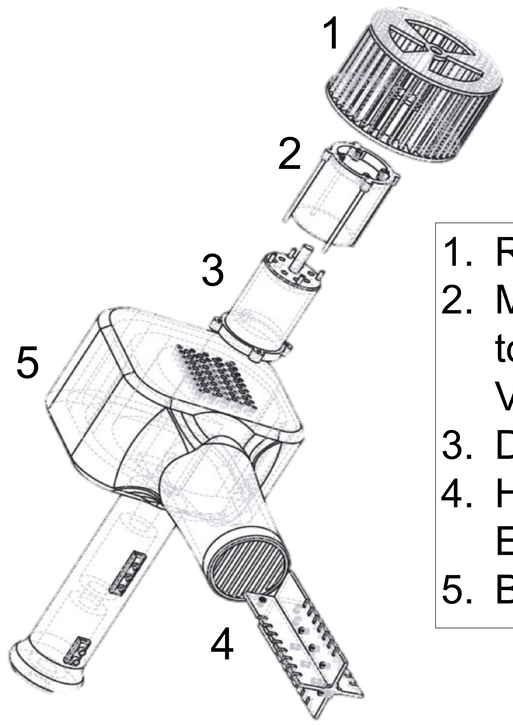



Fig. 2: Plot showing SPL at locations around hair drying device and with specific sound insulations[1]

## Project Outline




## Concept Design




1. Radial Blade
2. Motor Casing to Damp Vibrations
3. DC motor
4. Heating Element
5. Body Casing

Fig. 3: Team 6 Concept Design

## Future Plans

- Finalize motor selection
- Begin detailed design of exterior casing
- Perform sound intensity measurements
- 3D print completed parts
- Prepare heating element and electrical components from purchased hair dryer

## References

[1] Akehmetov, B, and Gupta, S, and Ahuja, K; "Noise Source Ranking of a Hair Dryer.", AIAA

[2] Shen, M, and Lin, S, and Chen, W; " The study of improving the performance and the noise of a hair dryer"; ISTP

[3] "What is Noise?", BRD Noise & Vibration Control, Inc. from http://www.brd-nonoise.com/RequestDetails.aspx

[4] http://www.mne.psu.edu/lamancusa/me458/11_fan.pdf

[5] http://www.hse.gov.uk/pubns/top10noise.pdf