



GUST

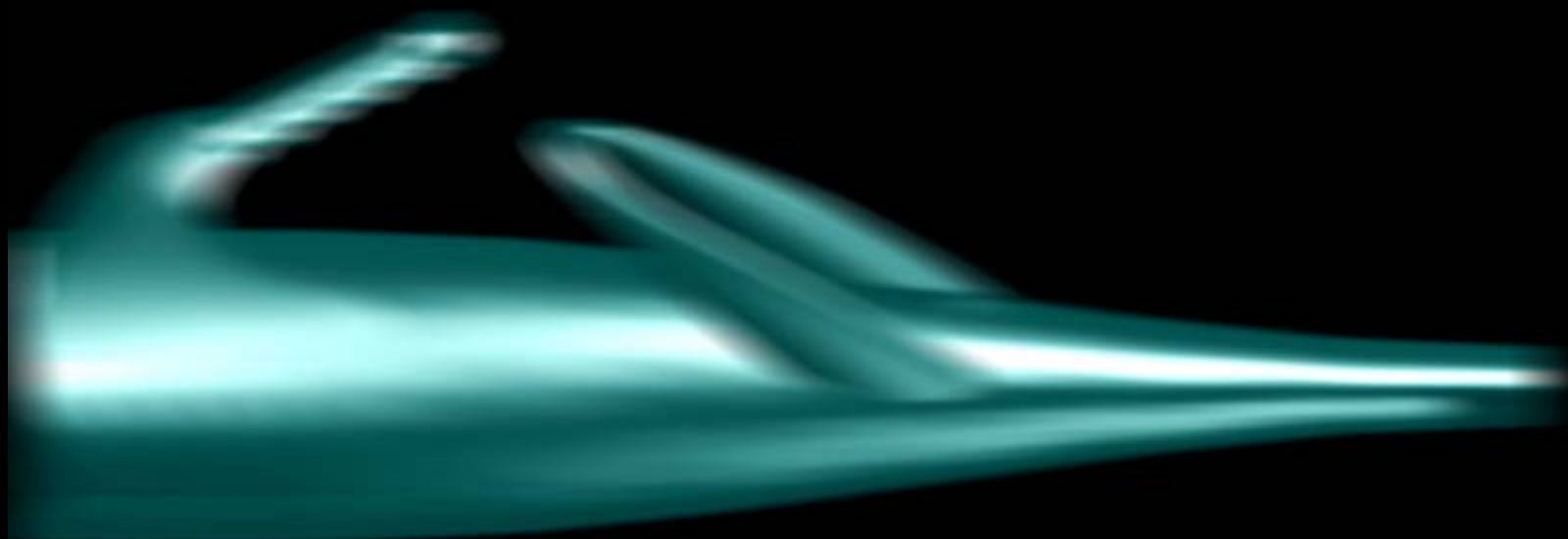
Team A

Randy Chang, Luis Garcia, Robin Liu

Bob Perez, Matt Notary, Harris Yong







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The background of the slide features a repeating pattern of a leaf blower's internal components, specifically the impeller and housing, rendered in a light green, semi-transparent style. A bright, horizontal green light streak with a lens flare effect cuts across the upper portion of the image, passing behind the title text.

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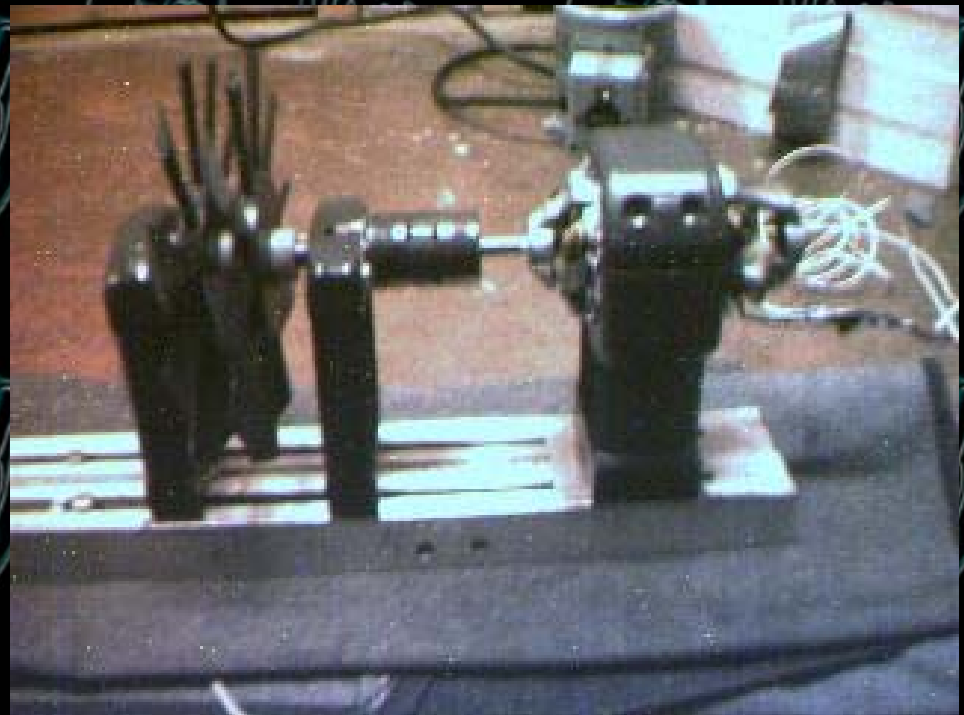
The engineering problem

- Over 20 California cities have banned leaf blowers due to excessive noise
- Design a quieter leaf blower with comparable performance to current models
- Maintain or supersede portability and durability of the competition

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Solution: GusT

- Reduced motor rotational speed
- Dual stage axial flow configuration
 - inline components reduce size while maintaining performance



The background of the slide features a repeating pattern of a mechanical component, likely a turbine or compressor stage, rendered in a light blue/cyan color. A bright, horizontal light streak or lens flare effect cuts across the upper portion of the image. The word "Gust" is written in a stylized, italicized font with a blue-to-purple gradient, and a large "T" is positioned to its right.

*Gust*T

Performance

- Flow rate: 0.09 m³/s (196 ft³/min)
- Nozzle speed: 31 m/s (68 mph)
- Top tested operating speed: 7350 rpm
- Peak noise at operating speed: 90dBA
@ 1m



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Dimensions

- 40 inches length (1.0 m)
- 8 inch maximum diameter (0.2 m)
- 8 pounds estimated (3.6 kg)



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Elegant design

- Minimal parts
 - Easy to assemble
 - Reduced manufacturing costs
 - \$30 manufacturing costs
- Limited mechanical complexity
 - No gears, belts, etc.
 - Increased durability for practical use

The background of the slide features a repeating pattern of stylized, glowing green axial flow fans. A bright green horizontal beam of light passes through the center of the image. In the top left corner, the word "Gust" is written in a stylized, glowing green and blue font.

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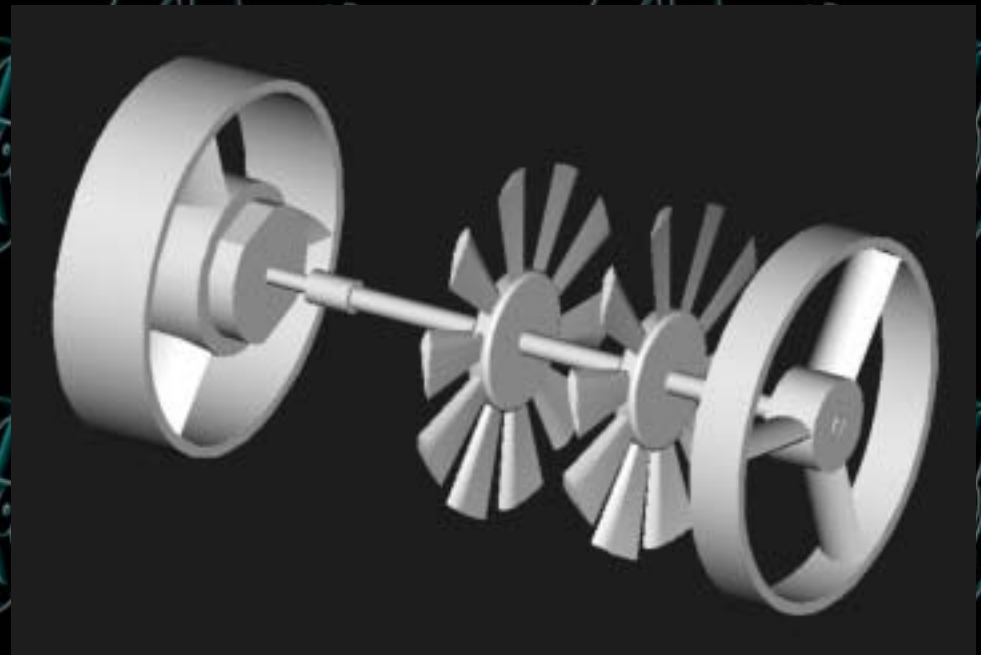
Basic principle

- Lower noise requires operating at a lower rpm
- Serial staging necessary for sufficient pressure and velocity
 - Axial flow fans best suited for serial staging
 - Innovative approach

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Design details

- Motor capable of 7500 rpm
- Two fans (each with 10 blades)
 - mounted on compact 6 inch shaft

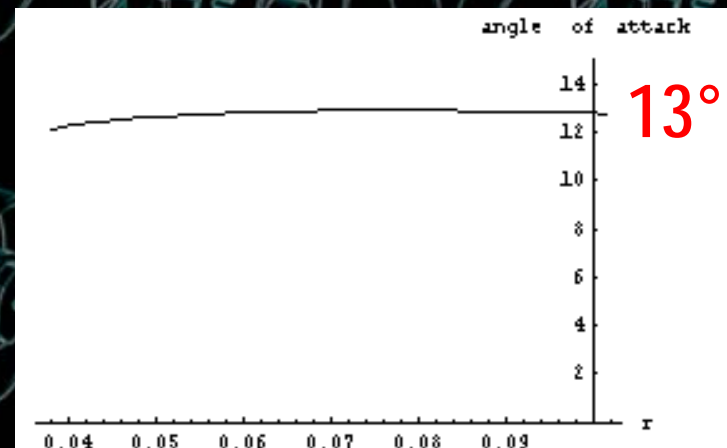
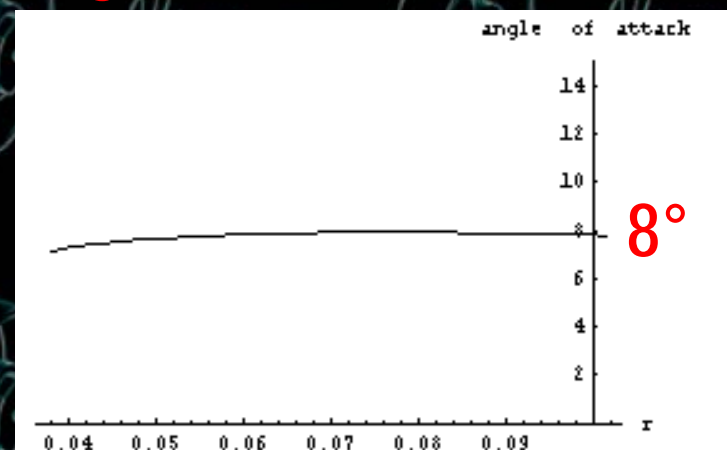


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Blade design

- NACA 0015, reinforced at hub
- True angle of attack at 7000 rpm: 13°
 - Began conservatively (8°)

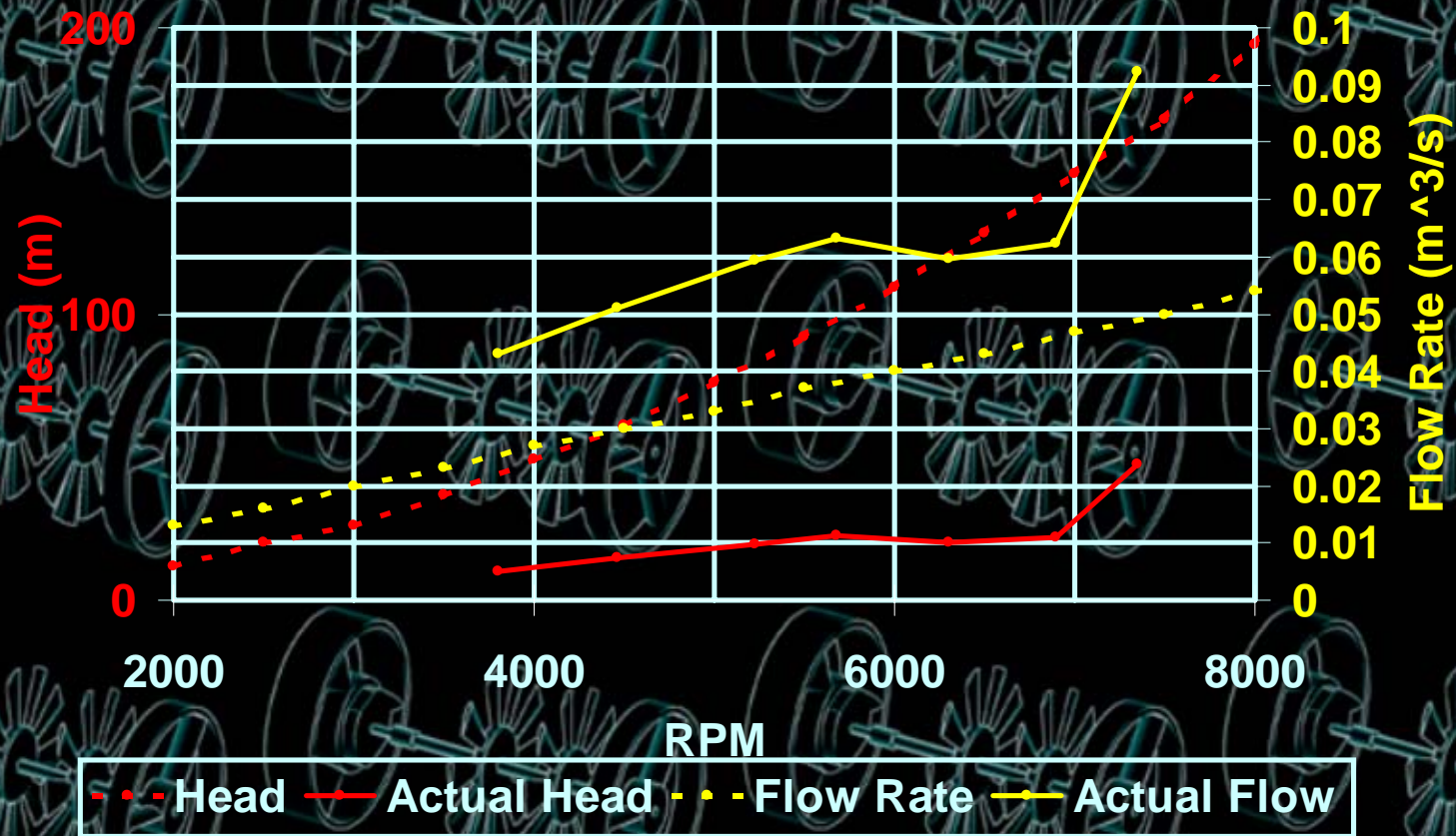
Angle of attack vs. radius



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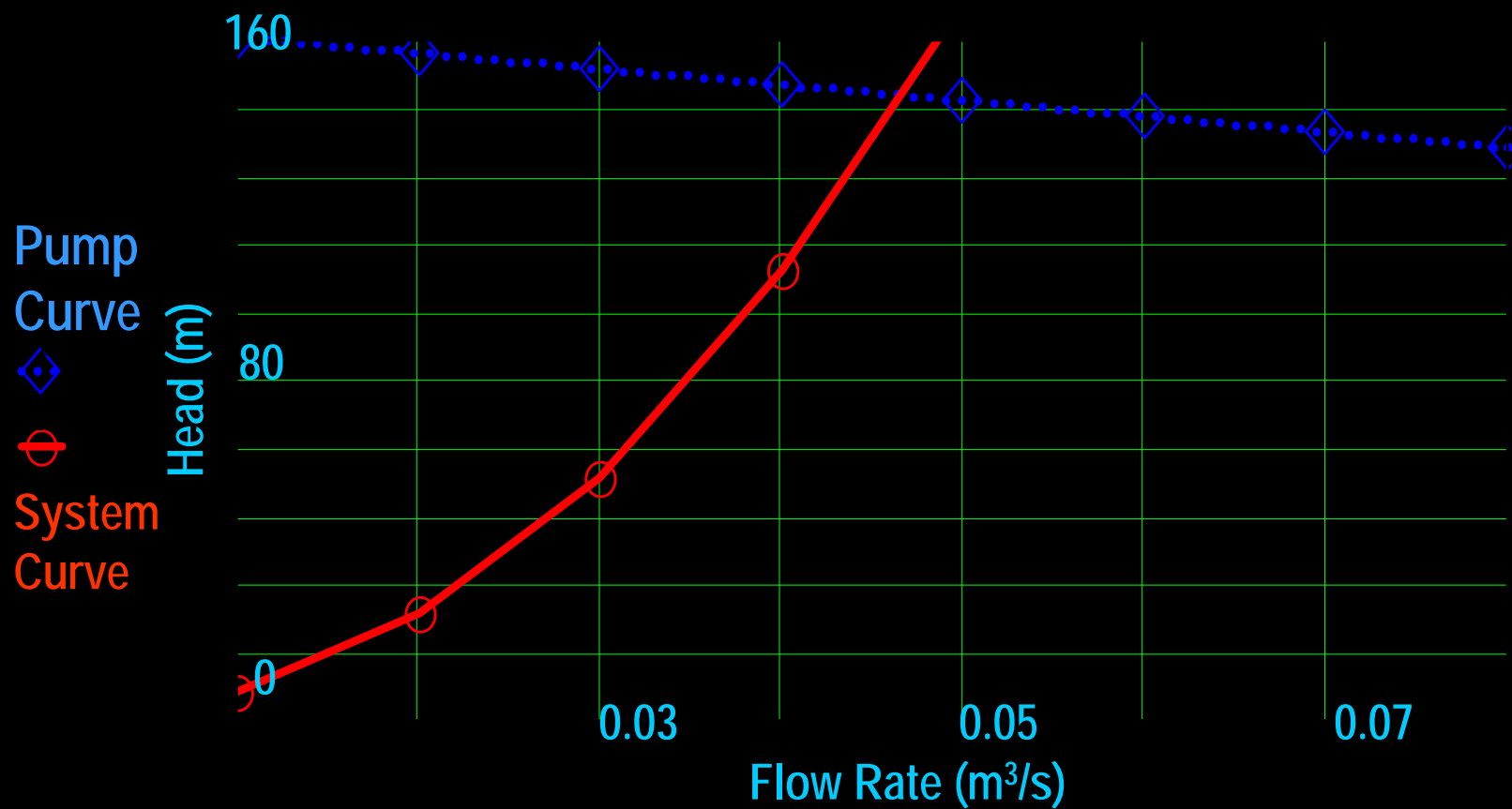
Performance details

Head and Flow Rate vs. RPM



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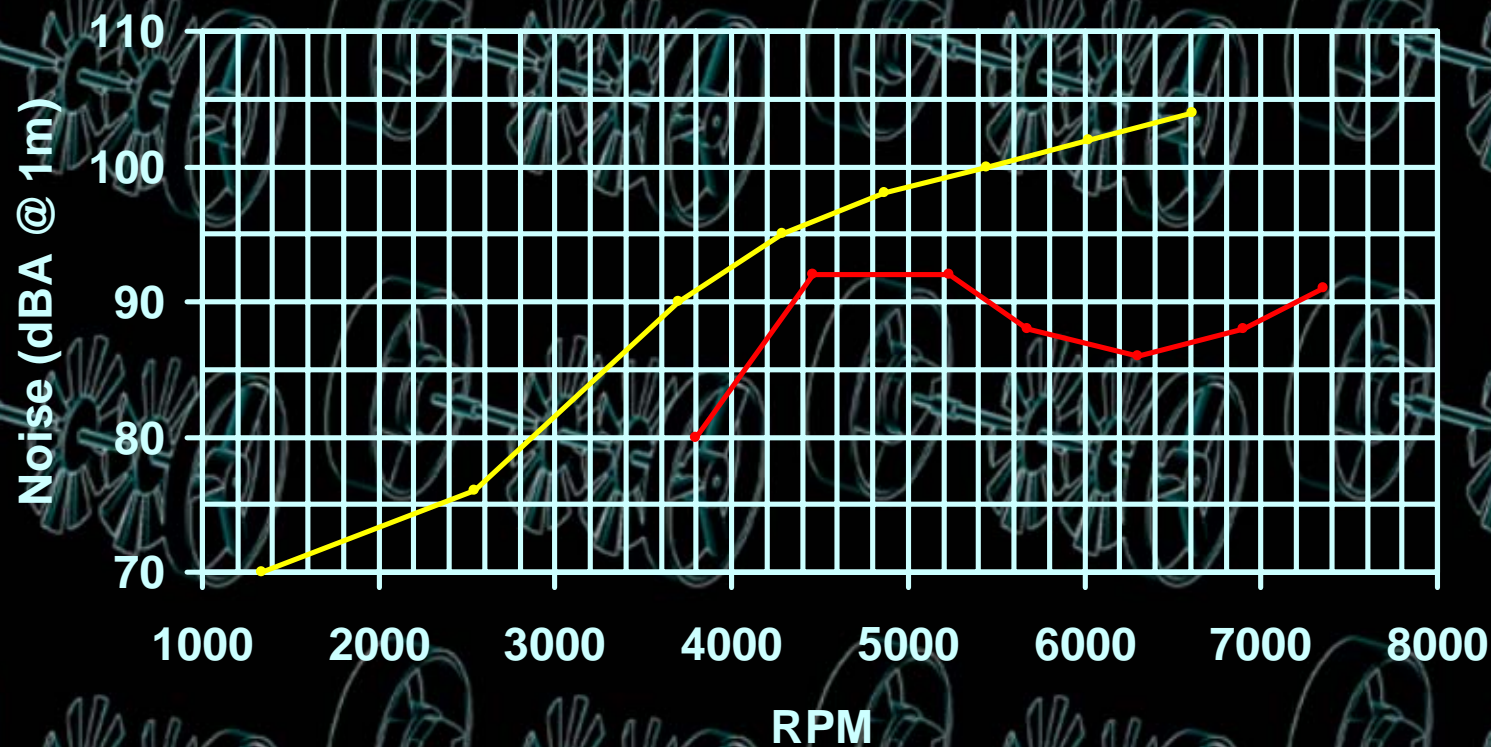
Performance details



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Noise

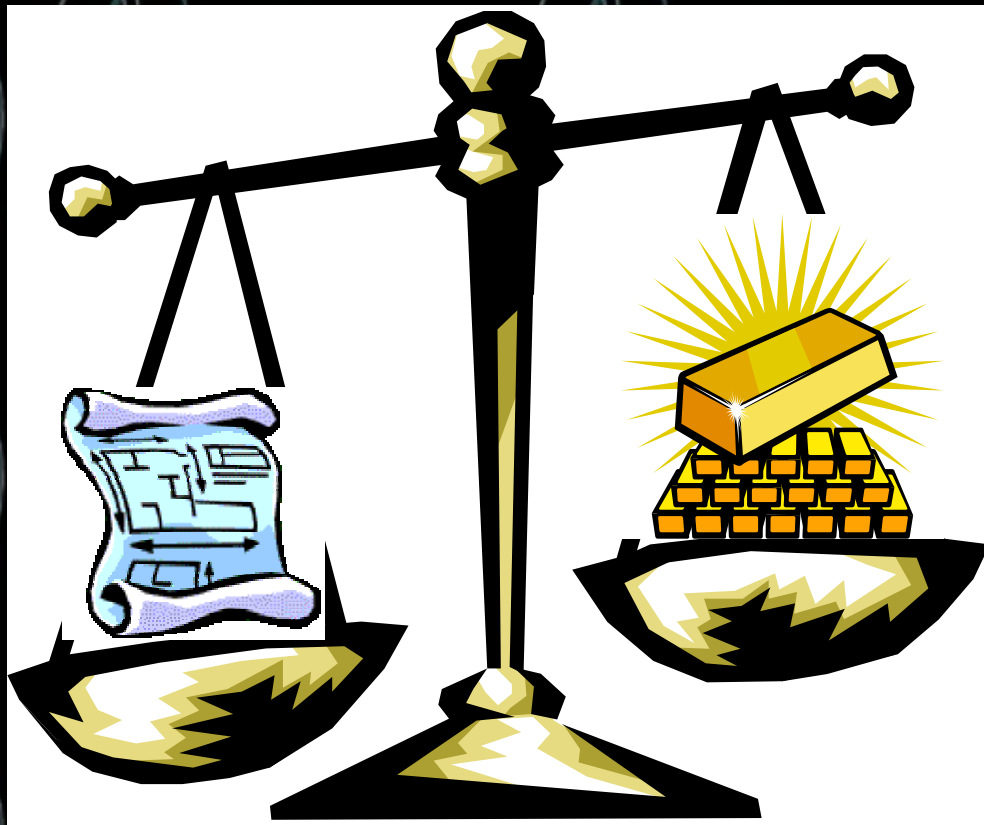
Noise (dBA)



—●— Prototype (dBA) —●— Final (dBA)

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"Data is gold"





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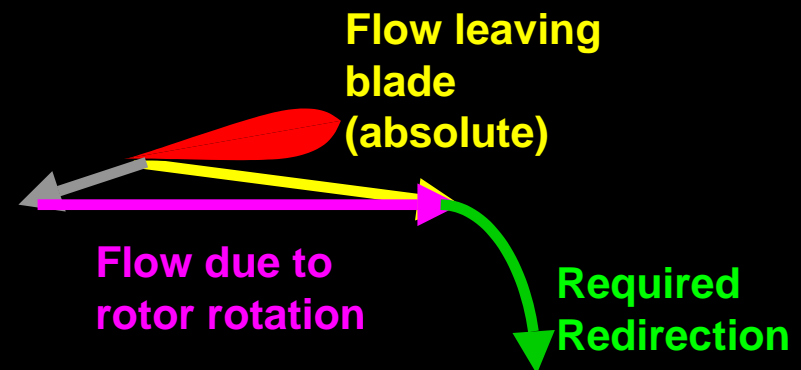
Iteration

- Problems with first iteration:
 - Flow blockage by 2nd fan
 - Increased angle of attack for first fan
 - Excessive noise caused by vibrations
 - Integrity
 - Good flow but low speed
- 18.5 m/s (41 mph), 0.053 m³/s (112 ft³/min) at 6500 rpm

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Stators

- No feasible stators for 80° redirection
 - due to high rotational speeds
- Best flow with fans close together (half inch)



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1st test pictures





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Unprecedented Cosmetic Individuality

- Design philosophy
 - Performance alone cannot make a unit competitive in today's market
 - Performance and aesthetic appeal can coexist





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*Unprecedented
Cosmetic Individuality*

- Lightweight, sleek, and compact

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Unprecedented Cosmetic Individuality



- 3 Handles
 - Strive for user comfort
 - Strive for user control and command over machine
 - Portable





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The GusT Advantage

- Efficient inline design
 - Reduced manufacturing costs
- Low rotational speed
 - Quiet operation
- Good basis for future work



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