



ELEVATE

A Compact Standing Desk Converter

Prototype Presentation

12/9/2022

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The Problem

Adjustable standing desks have several physical and mental health benefits. However, there currently exists a barrier to entry for potential standing desk customers. Their only available options are to buy a new standing desk or an obtrusive standing desk converter. The former has a high cost and lacks portability while the latter lacks the full capabilities of a true adjustable standing desk.



Expensive



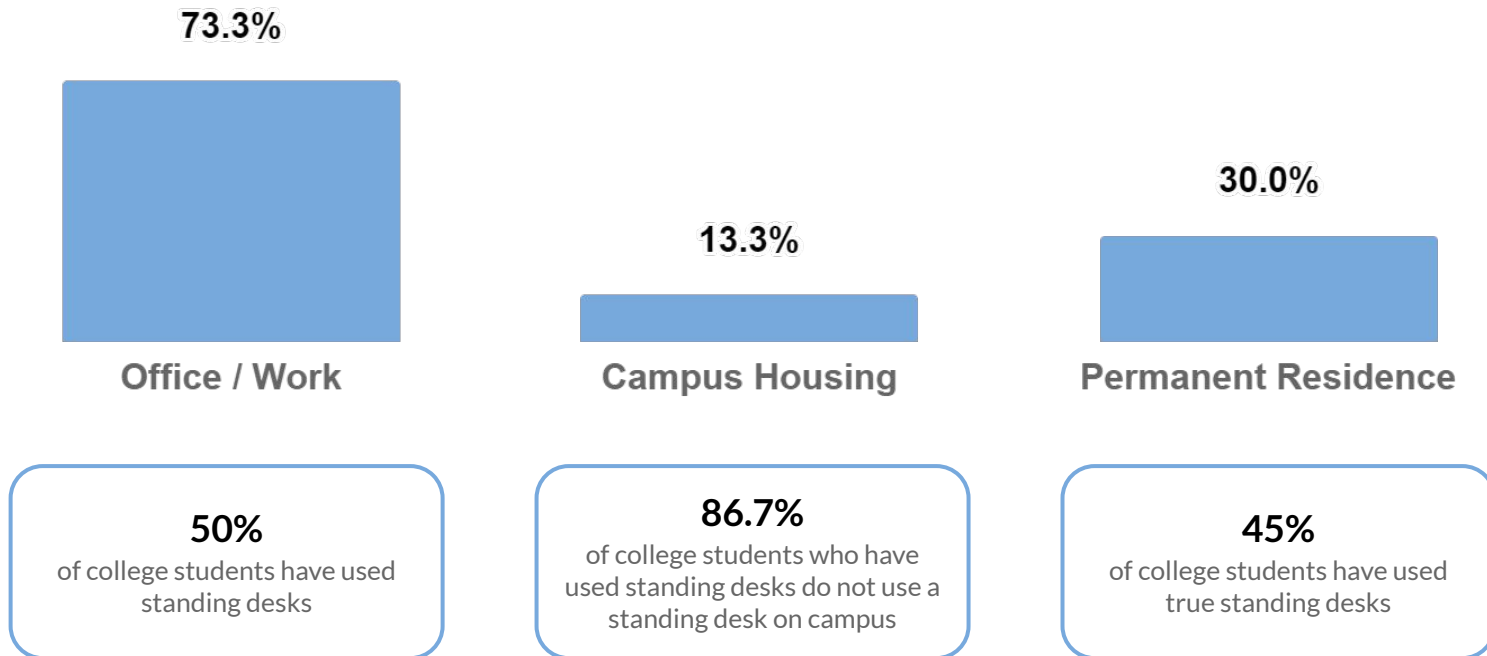
Lack of Portability



Obtrusive

The Market

Where College Students Use Standing Desks

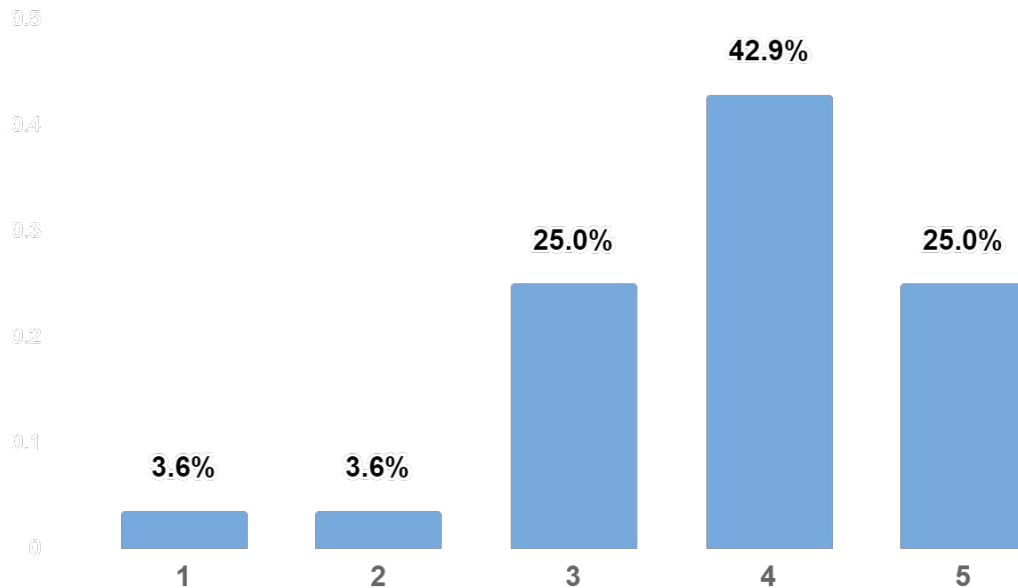


The Competition

The True Standing Desk



Aesthetics Rating of True Standing Desk

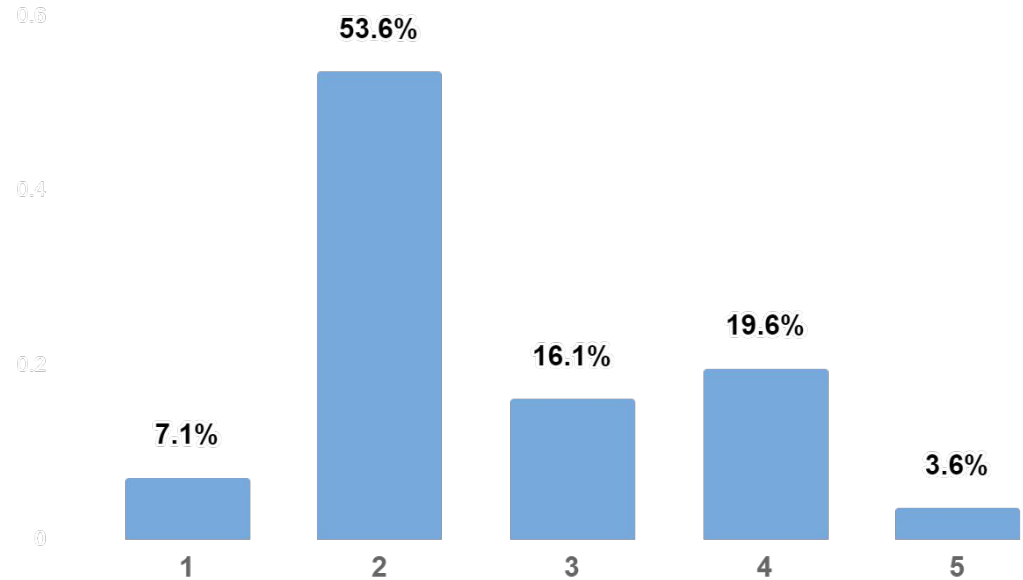


The Competition

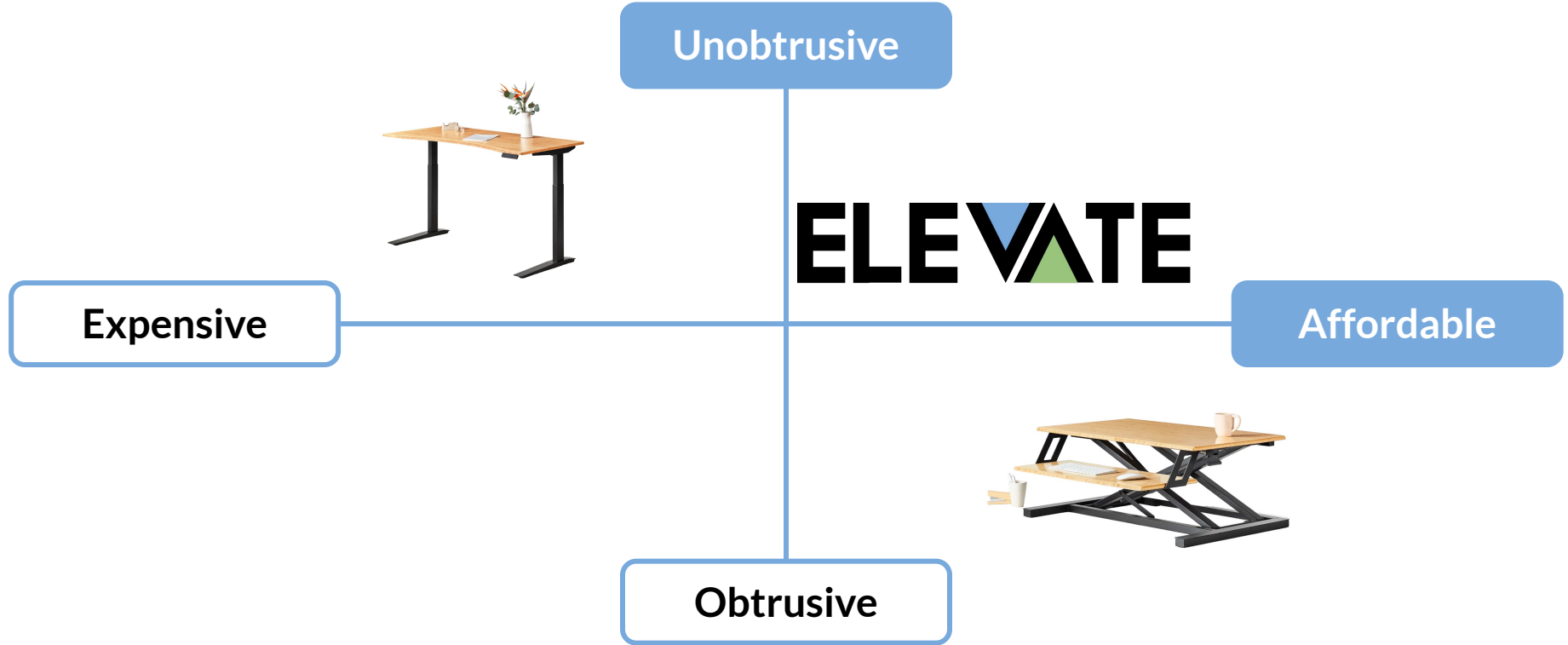
The Standing Desk Converter



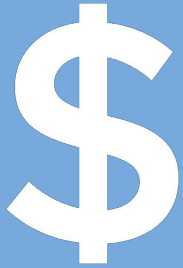
Aesthetics Rating of Standing Desk Converter



The Competition

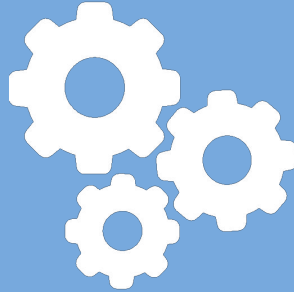


Our Customers



Business Owners

and other employees
and employers who
have a budget and are
looking for **lower cost**
solutions



Artists

And other individuals
who are looking for a
retrofittable solution
to keep their current
setup



College Students

and other individuals
who do not have a
permanent desk setup
and are looking for a
portable solution

System Characteristics



Functional
300lb at $\frac{1}{2}$ " / sec
1.5' adjustability



Affordable
< \$300



Reliable
Load cycling
IP62 rating
UL consumer
product ratings



User-Friendly
Portable
Unobtrusive
Easy to install
Intuitive



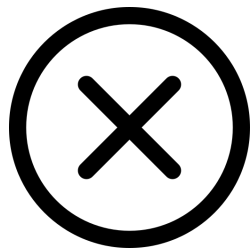
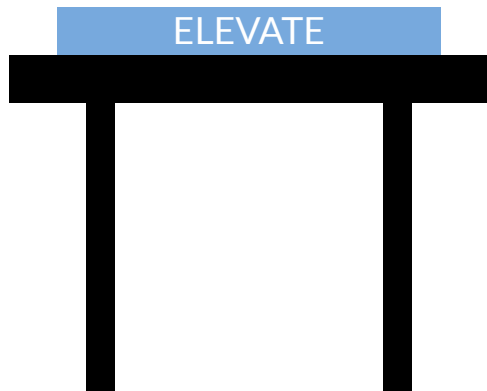
Universal
Works for
majority of desks



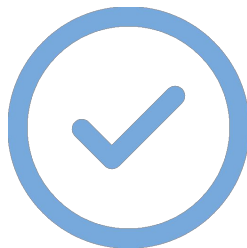
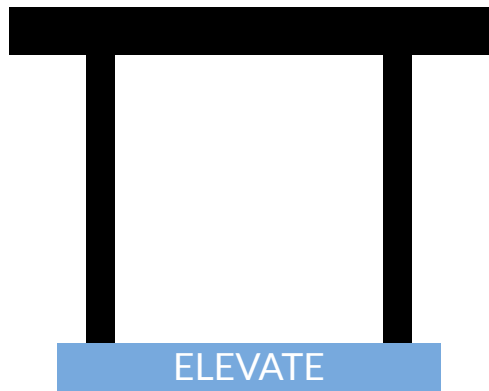
Safe
No backdriving
Rigid
Stable

Concept Selection

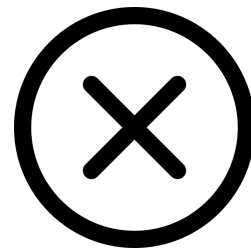
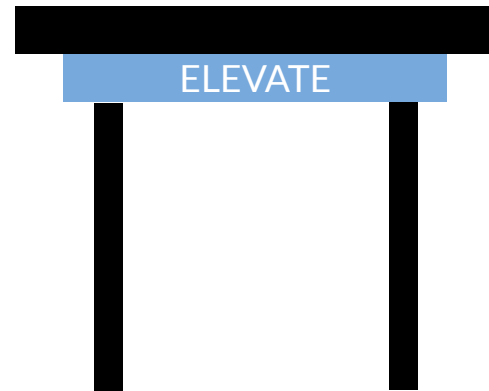
On Desk



Under Legs



Under Desk



System-Level Selection

	Lead Screw	Hydraulics	Pneumatics	Rack and Pinion	Scissor Lift	Cascade Lift
Cost	5	1	2	4	3	3
Reliability	5	1	3	4	5	1
Complexity	5	1	2	4	3	1
Resolution	3	1	2	4	5	2
Packaging	5	2	3	4	1	1
Safety	5	3	3	1	5	1
Total	28	9	15	21	22	9

Final System Form

Lead screw with tube supports


Worm-gear assembly for no
backdrive

Small footprint

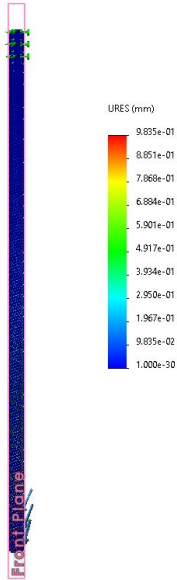
*Covering case hidden to show
mechanisms



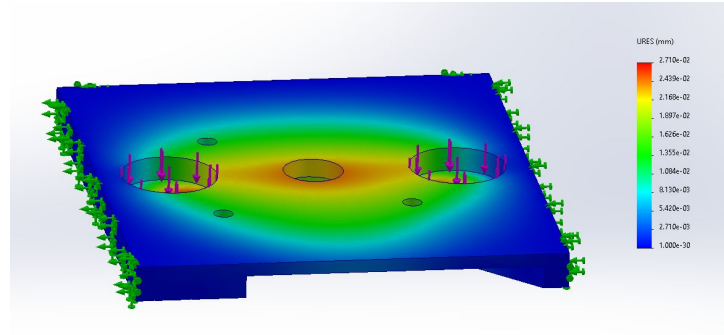
Our Advantage

		Standing Desk Converter	True Standing Desk
Volume (in ³)	16" x 5" x 30"	30" x 25" x 5"	48" x 30" x 25"
Weight (lb)	50	50	110
Cost (\$)	300	200	500
Retrofittable	Yes	Yes	No
Obtrusive	No	Yes	No
Easy to Install	Yes	Yes	No

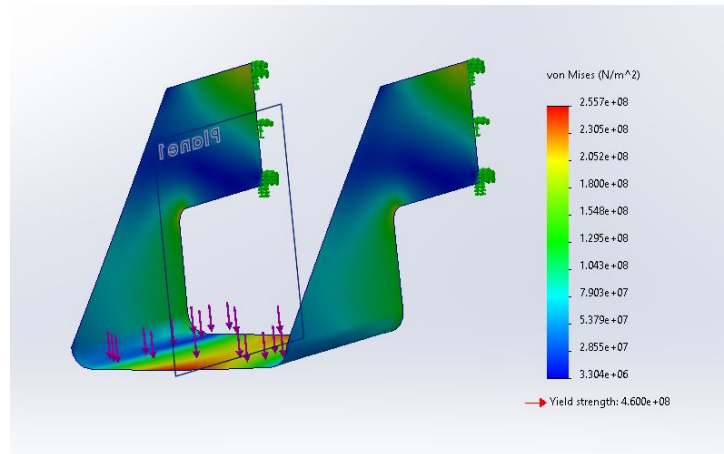
Design, Engineering, Prototyping



Lead Screw
Stiffness-limited
part



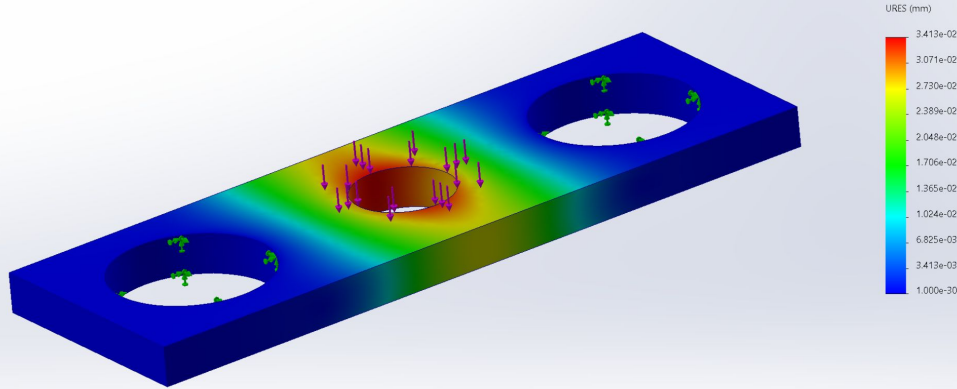
Baseplate
Stiffness-limited part



Leg Holder
Strength-limited part

Load about ½ of yield
strength. Fatigue not a
worry

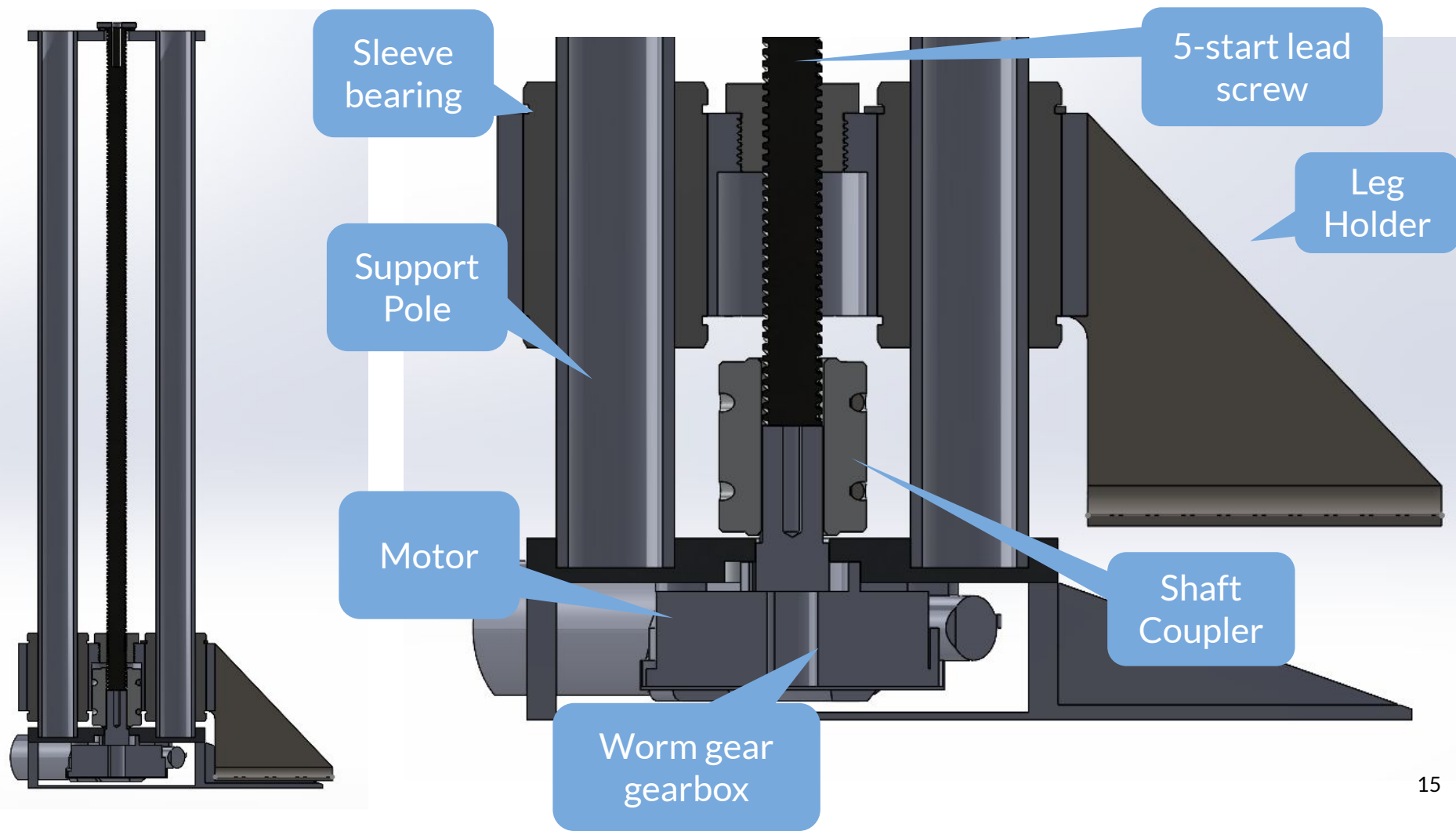
Design, Engineering, Prototyping



Top Plate

Stiffness limited part

Maximum load, deforms appropriately



Motor Validation

Ideal vs Prototype Performance Specs

	Ideal Motor	Snow Blower Motor Tested	Notes
Power [W]	$\geq 15W$	> 40W	Very good safety factor. 40W likely is power supply limit, not motor limit.
RPM	90 - 120 RPM	~ 95 RPM	For 1 - 1.5 in/sec rise rate
Size [in]	$\geq 4"$	~ 4.75"	From output axis to outermost point, to reduce total footprint
Price [\$]	< \$15	\$19	Actually good that prototype small batch quantity has similar price to production goal

Takeaways:

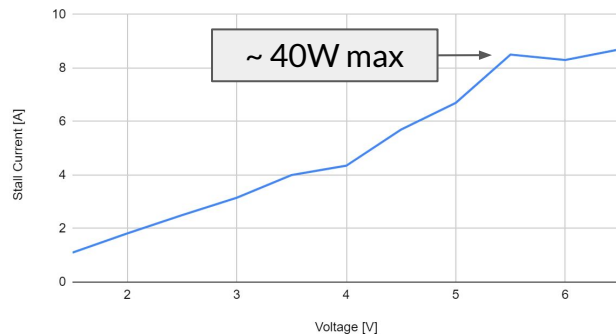
- Motor good for prototype
- Keep searching for smaller/cheaper



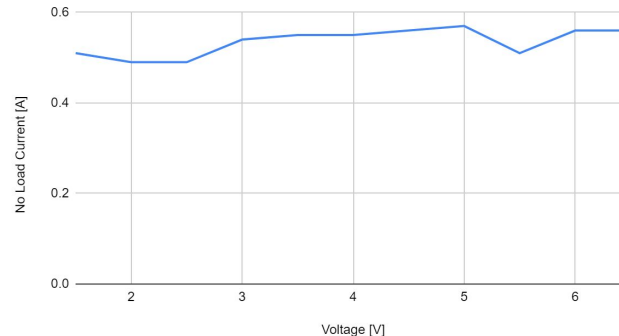
Andymark am-2235a Snow Blower Motor



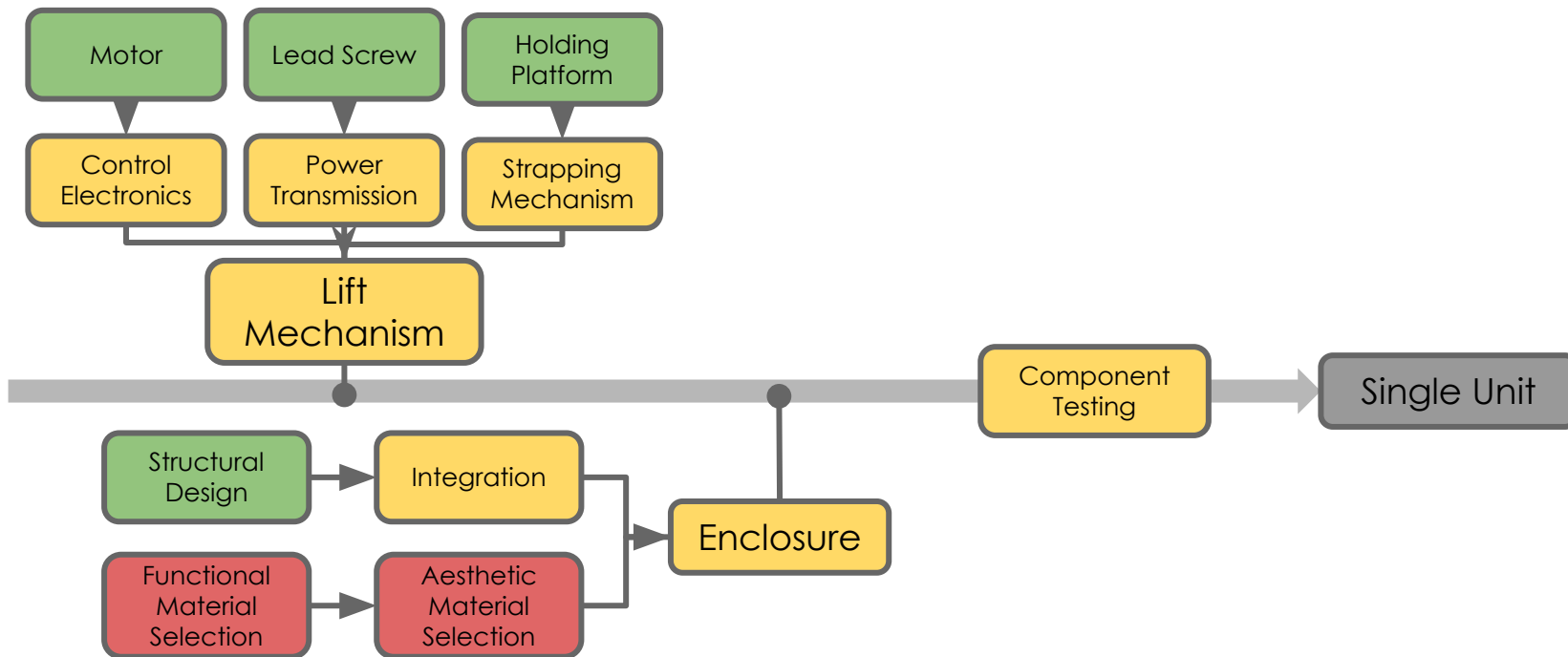
Stall Current [A] vs. Voltage [V]



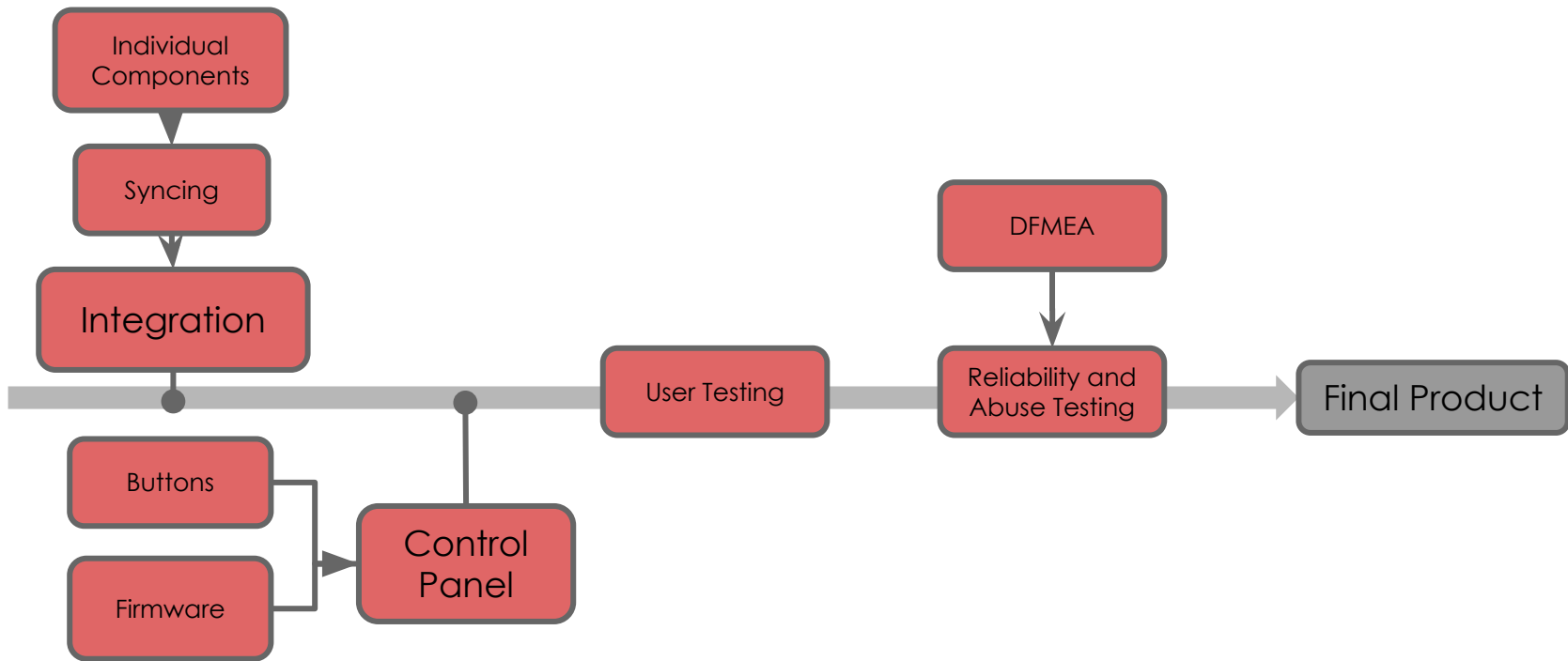
No Load Current [A] vs. Voltage [V]



Our Timeline



Our Timeline



The Team

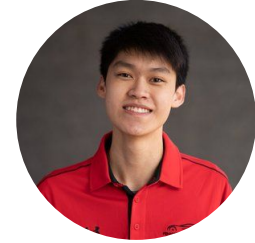
Founders



Griffin Addison
MEAM & ROBO



Darrion Chen
MEAM, Design and
Manufacturing



Jonathan Lee
MEAM & ROBO

Advisors



Bruce Kothmann
Faculty Advisor



Graham Wabiszewski
Senior Design Professor



Joah Kim
Team Advisor

References and Photo Credits

- Slide 1
 - <https://medium.com/halting-problem/local-engineer-refuses-to-work-without-a-standing-desk-fa3c0ef7a2a4>
- Slide 4
 - <https://www.fully.com/jarvis-adjustable-height-desk-bamboo.html>
- Slide 5
 - <https://www.fully.com/cooper-standing-desk-converter.html>
- Slide 6
 - <https://www.fully.com/jarvis-adjustable-height-desk-bamboo.html>
 - <https://www.fully.com/cooper-standing-desk-converter.html>