





## SPENCER REYNOLDS

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### EXPERIENCE

#### ***Procter & Gamble: Design Management Co-op Summer 2015***

Industrial Designer at the Fabric and Home Care Innovation Center

#### ***Johnson & Johnson: Ethicon - Industrial Design & Human Factors 2014***

Designed minimally invasive surgical tools as a full-time co-op for 7 months

#### ***Organized and Led the BYU Industrial Design Symposium 2013-2014***

Featuring industrial designers from Nike, Microsoft, and Black Diamond

#### ***CruxCase - Industrial Design Intern and Freelance Designer 2013***

Expanded CruxCase's product line using SolidWorks, KeyShot, and sketching

#### ***TREK Bicycle and Bontrager Helmets - Sponsored Project 2014***

Trek sought to expand its market share by introducing an everyday-use helmet

#### ***Whirlpool - Sponsored Project with the Advanced Design Group 2013***

Whirlpool corp. wanted to enter the sink market by meeting unpercieved needs

#### ***Disney Imagineering's ImagiNations Design Contest - Semifinalist 2013***

Proposed the location and attractions for Walt Disney's next theme park

#### ***Volunteer Representative in Kiev, Ukriane 2010-2012***

Planned, organized, and taught training meetings for over 30 full time volunteers focusing on self-improvement, dedicated service, and effective use of time. Served as a counselor to local leadership, interpreted, translated, conducted meetings, and scheduled interviews. Interacted daily with the Ukrainian people, gaining an appreciation for their culture.

### EDUCATION

#### ***Brigham Young University***

Bachelor of Fine Arts, Industrial Design, Graduating August 2015

Full Tuition BYU Academic Scholarship

3.83/4.00 Cumulative GPA

700 GMAT, 34 ACT

### SKILLS

#### ***Product Design***

3D Printing, SolidWorks, KeyShot, Adobe Illustrator, Adobe Photoshop, Adobe InDesign, SketchBook Pro, Crowdfunding, Wacom Tablet Rendering, Furniture Making, Wood Prototyping, and Marker - Pen - Pencil Rendering

#### ***Languages***

Ukrainian – Fluent

Russian – Survival

### AFFILIATIONS, AWARDS, ACTIVITIES

BYU IDSA President

Eagle Scout - Boy Scouts of America

Visited local troubled youth monthly and presented inspirational messages

Captain of intra-mural Inner Tube Water Polo, Soccer, and Ultimate Team

Soccer Referee for players ages 8-18 for 6 years

"Odyssey of the Mind" balsa wood structure problem State Judge 2009

### STRENGTHS

I am observant, driven, honest, reliable, inquisitive, and a team player.

I'm a morning person.

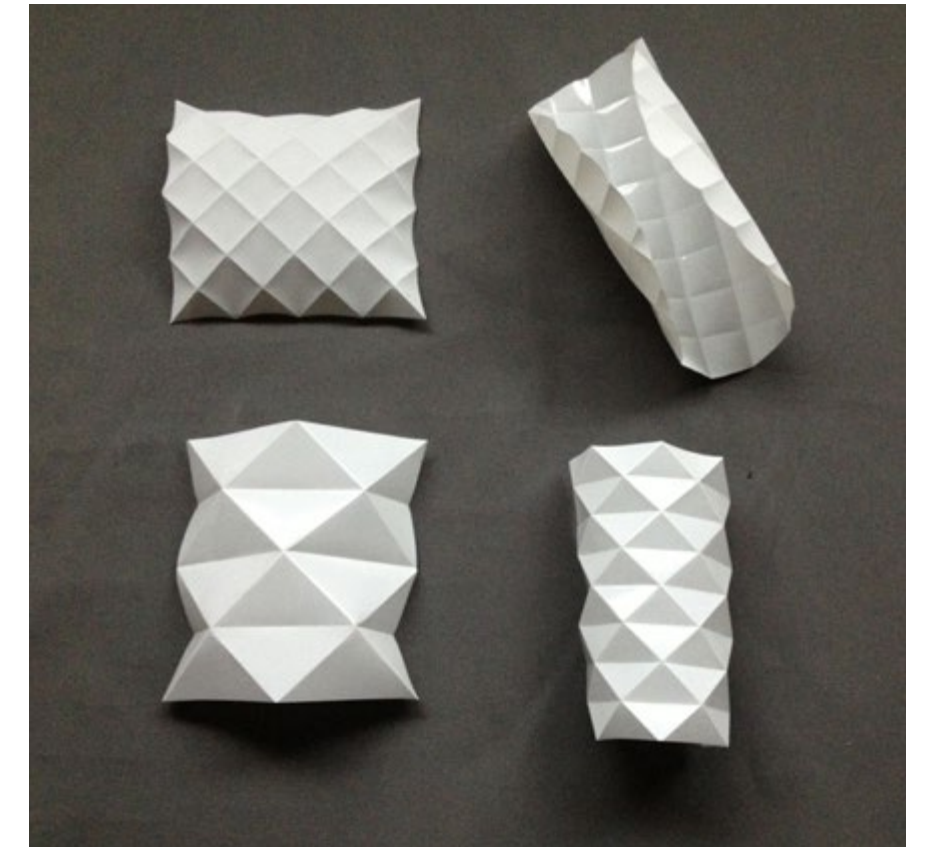


# Lights, Lamps, and Luminaires

## Design Brief

Work in a group to design a luminaire using thin polycarbonate sheets. Produce 15 units and sell them with other groups for \$30 each.

# Form Exploration



After exploring the folding and form properties of the polycarbonate material, we selected these pieces as our inspiration pressing forward.



## Initial Prototypes



## Base Exploration

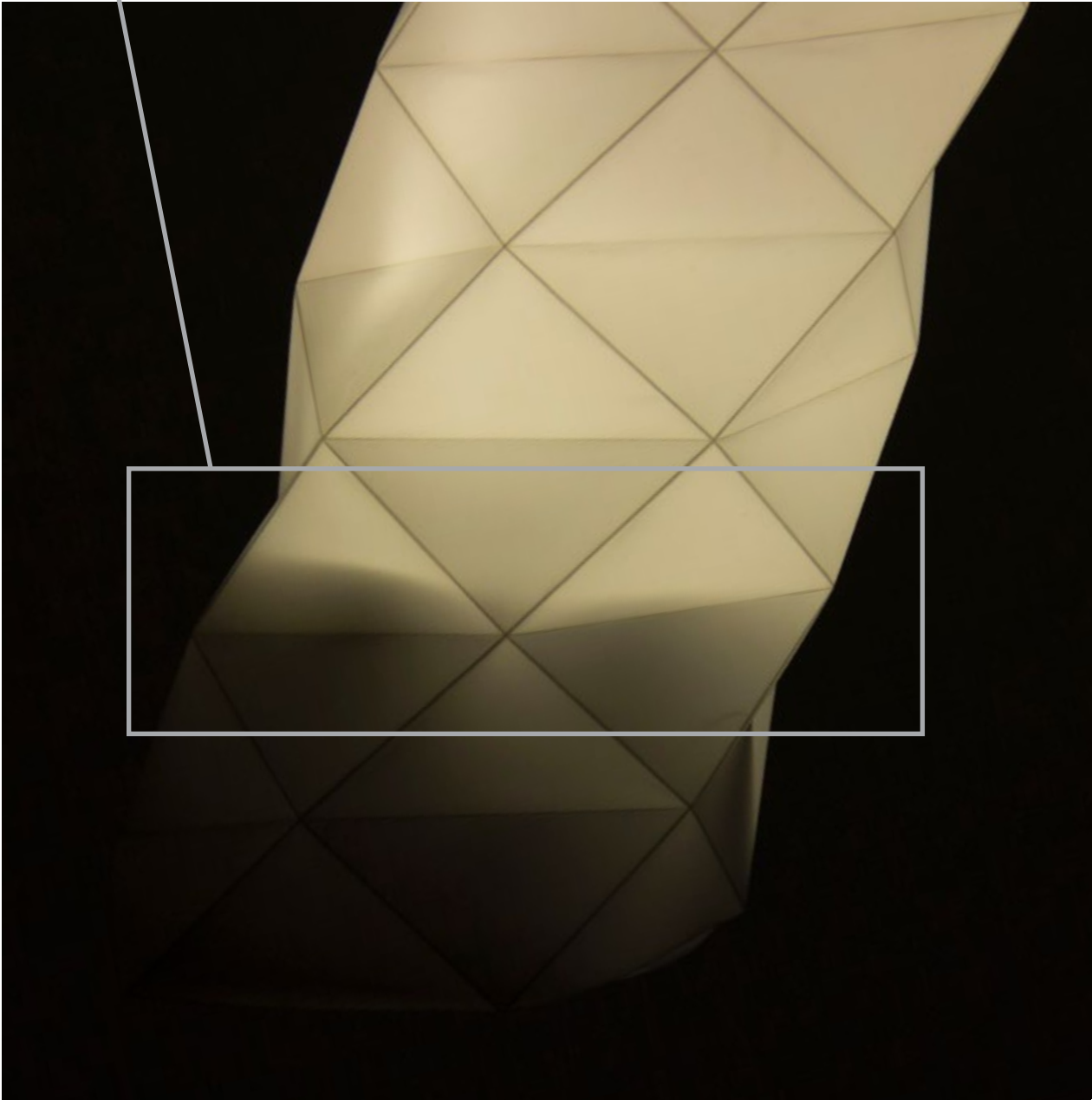


We decided to focus on a desk lamp and started to prototype bases for the lamp shade.

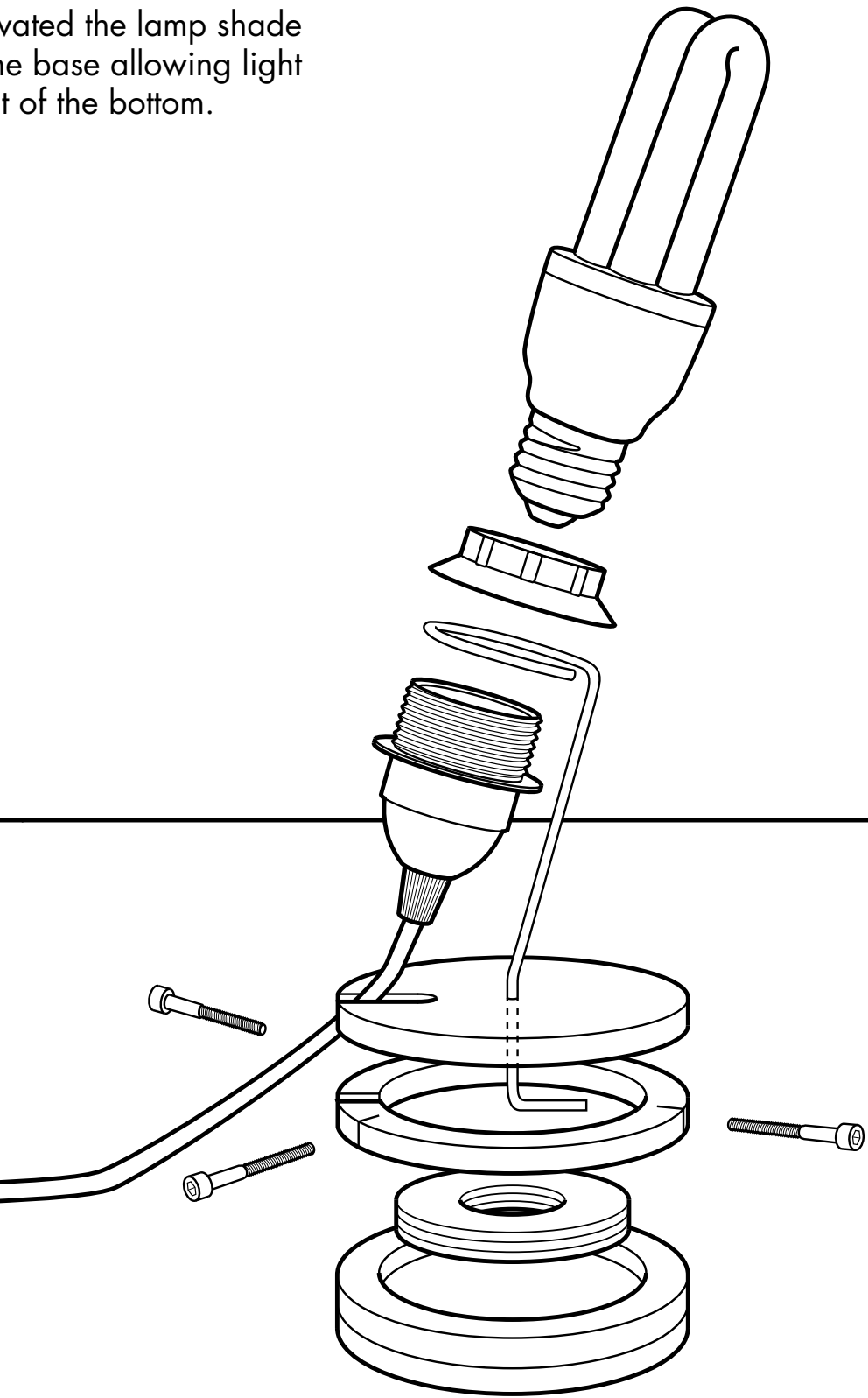
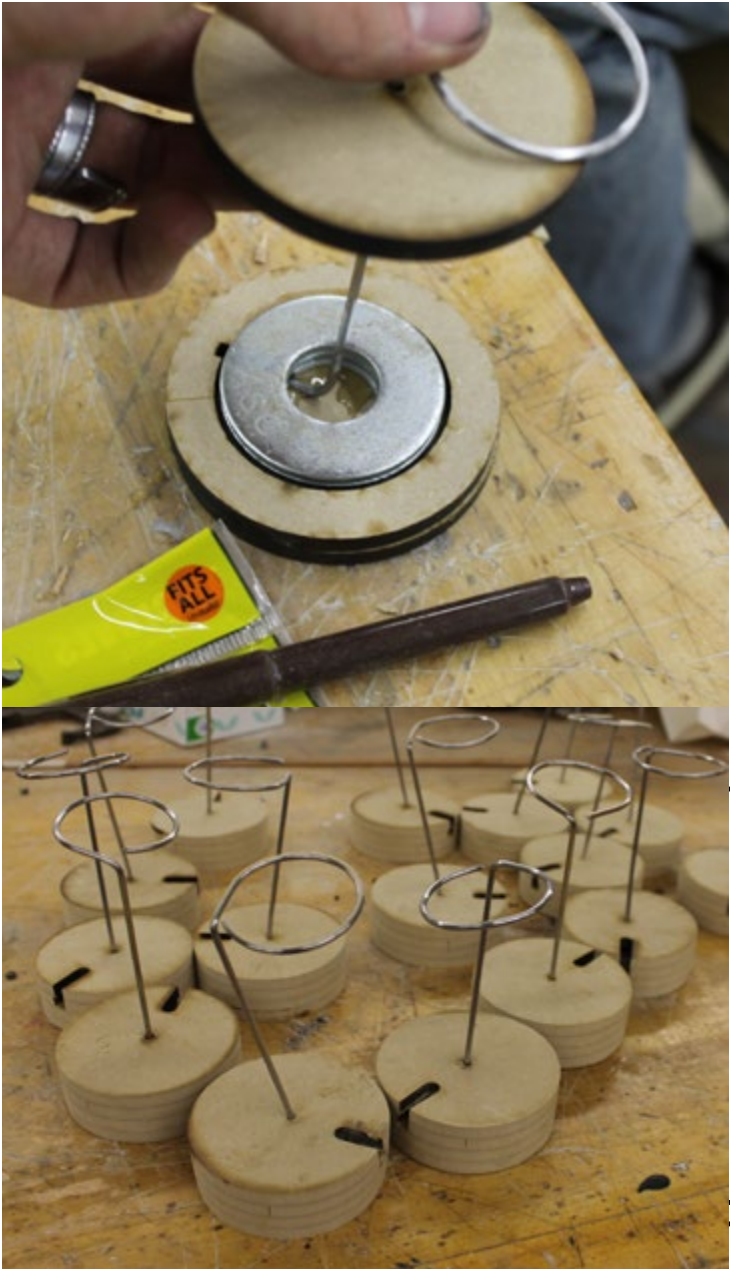


# Base Refinement

Problem: All of the bases we had tried did not allow light to flow evenly down the lamp shade causing an unsightly shadow along the base.

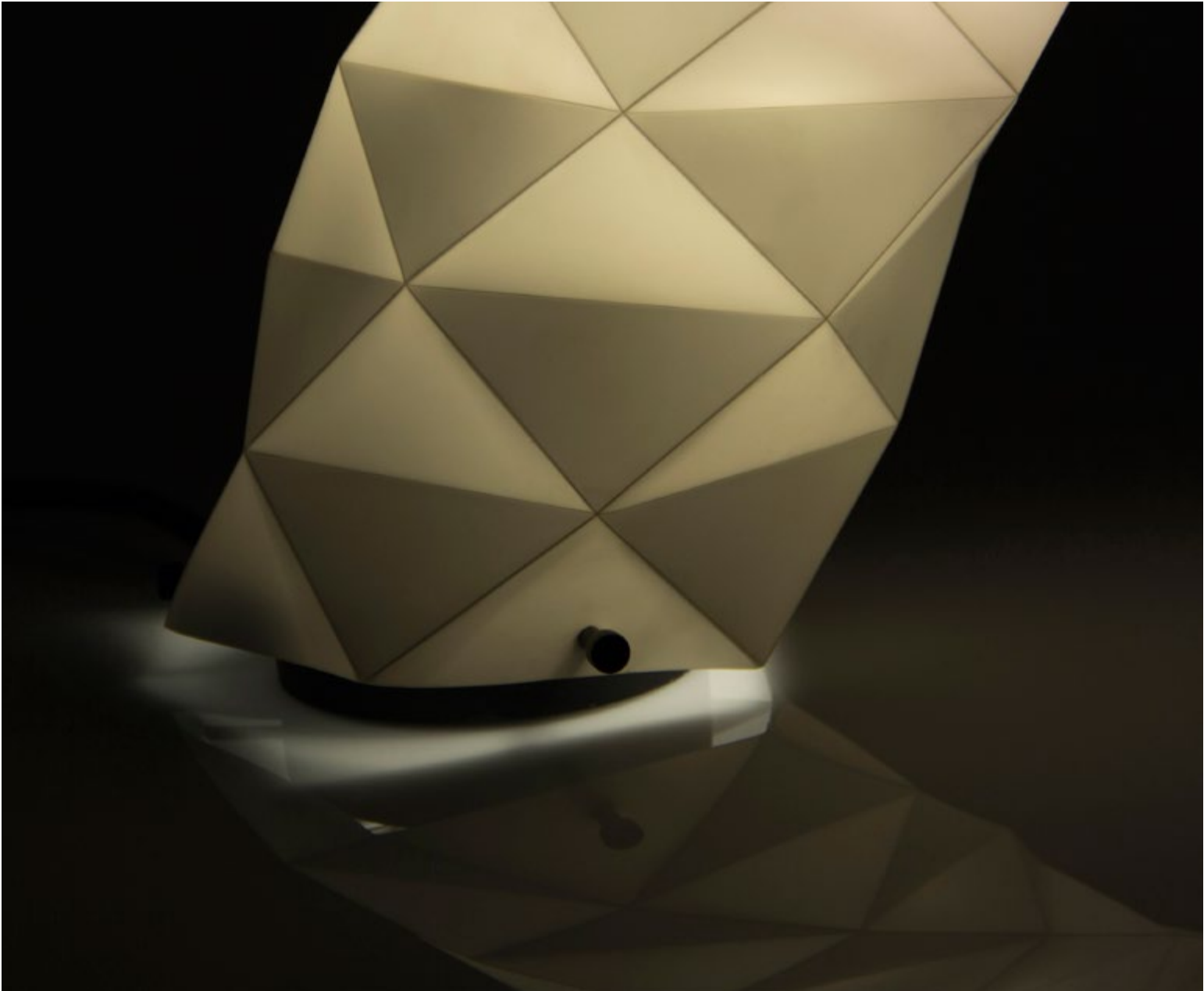


Solution: We designed an inset base that elevated the lamp shade and created space between the shade and the base allowing light to flow to the base of the lamp shade and out of the bottom.



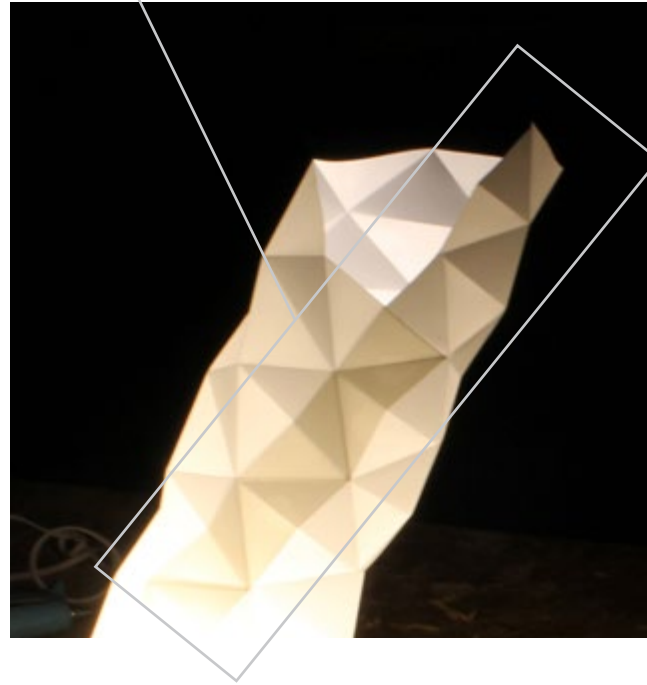
# Base Refinement

Lamp shade shown with the improved inset base

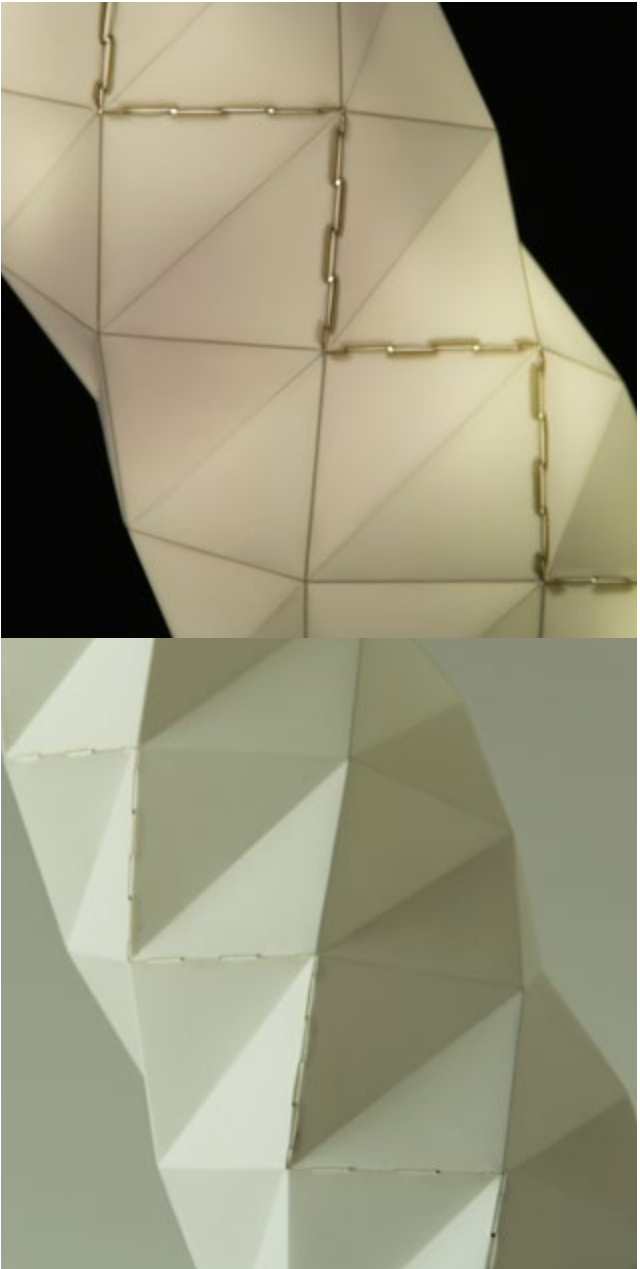


# Seam Refinement

Problem: The overlap of material in the shade was causing a shadow.



Solution: We implemented a set of small interlocking tabs. The tabs run along the edges of the form instead of cutting a line straight down the side. They eliminated the large shadow created by the overlapped polycarbonate.





Mass Production

The Sale











LEANING  
LUMINAIRE





# ETHICON

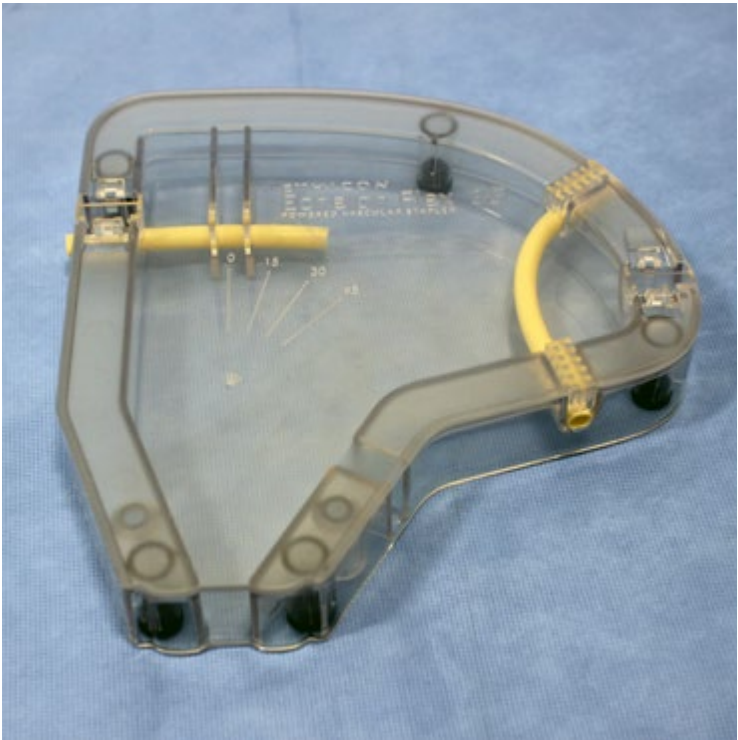
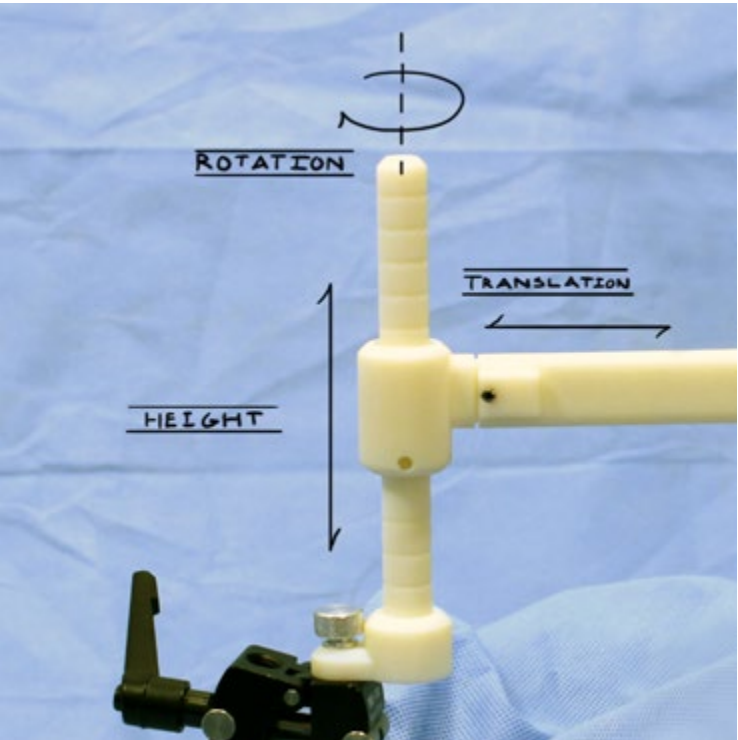
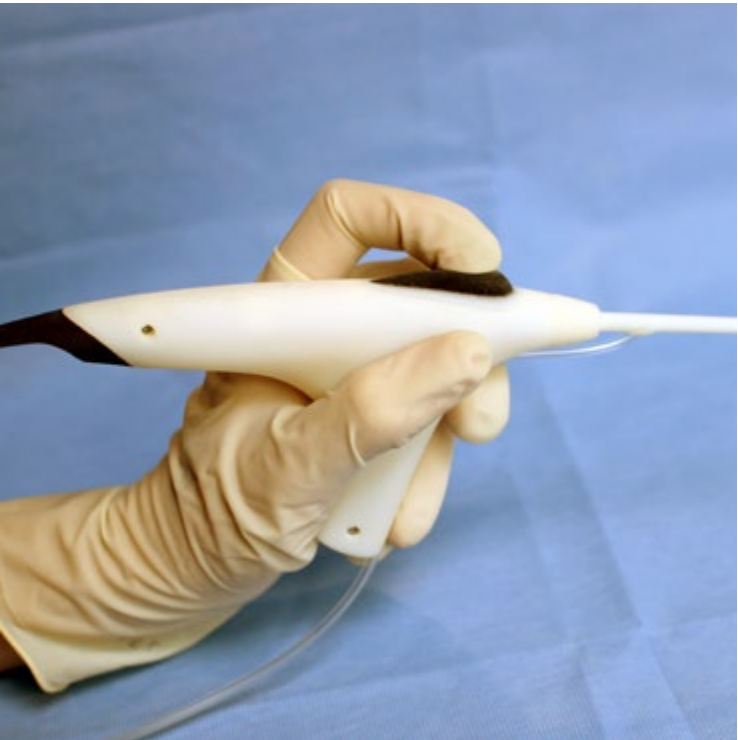
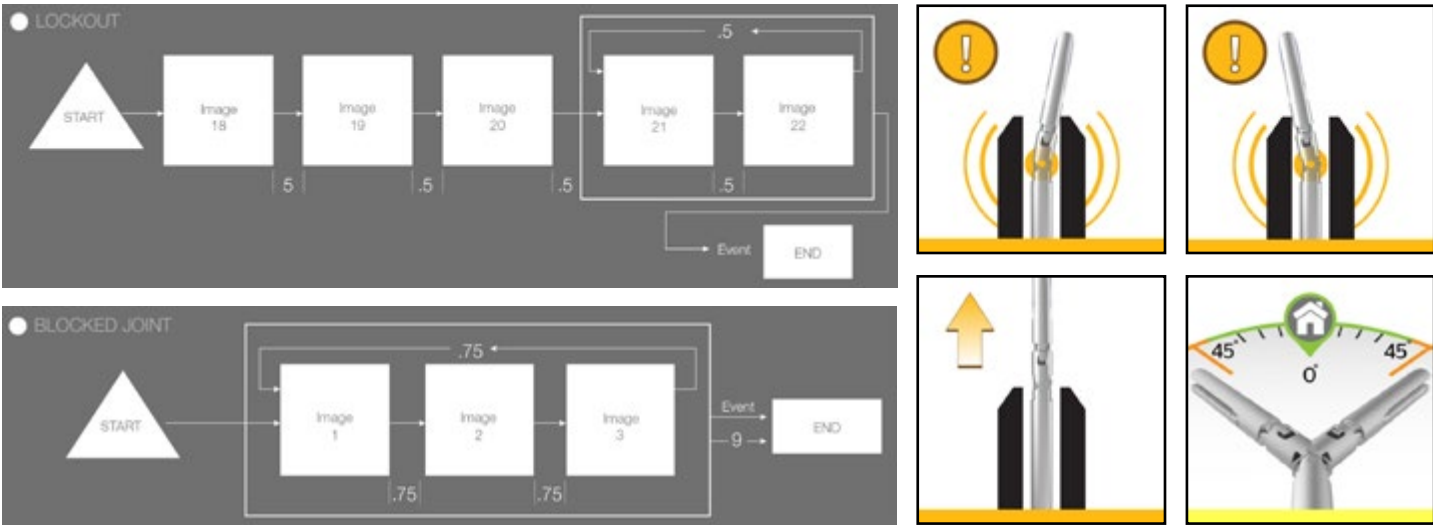
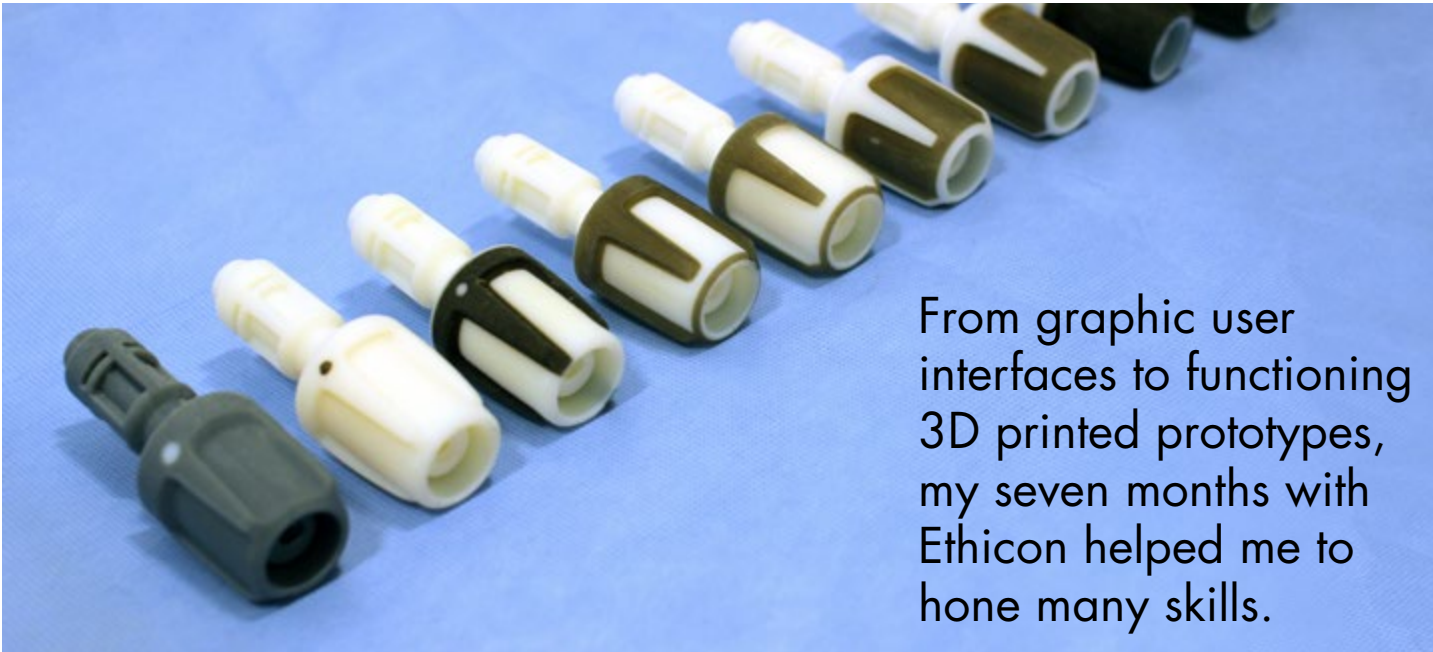
PART OF THE *Johnson & Johnson* FAMILY OF COMPANIES

Full Time Co-op - Summer & Fall 2014

I supported all phases of the design process including product research, ergonomics, concept sketching, product renderings, 3D database development, graphics, usability testing, and product marketing support.

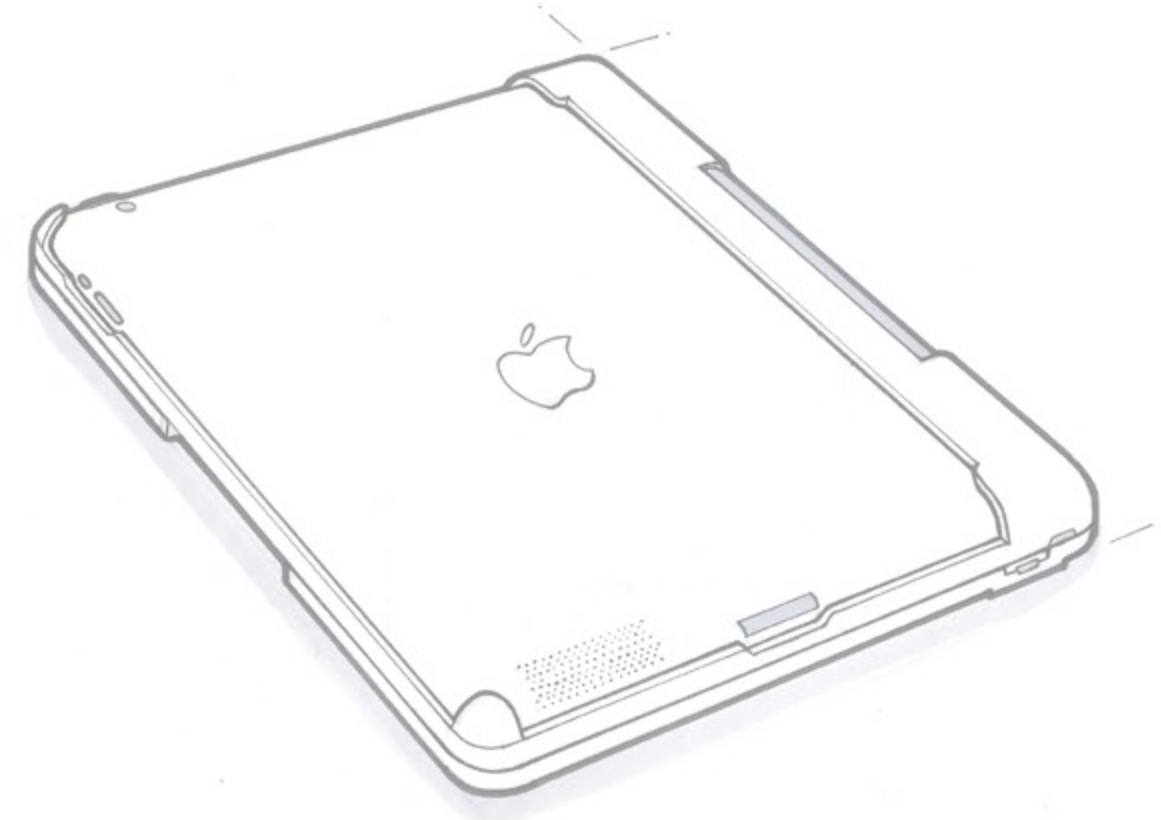
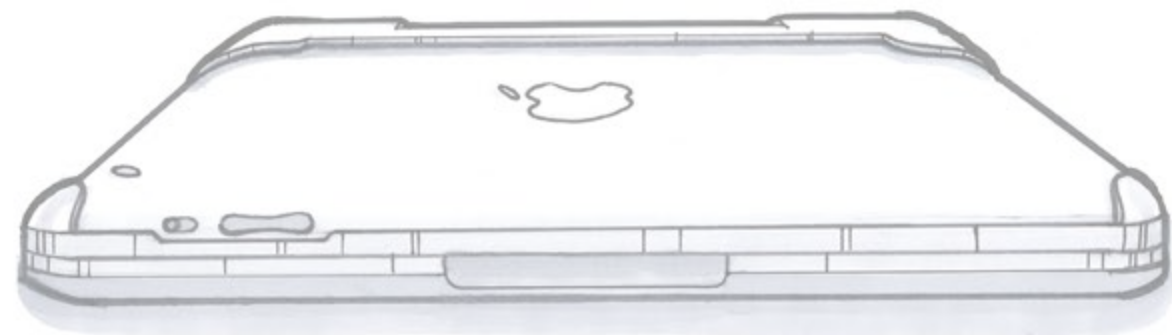
# Better surgery for a better world

The Industrial Design and Human Factors team in Cincinnati focuses on minimally invasive surgical tools for Ethicon, but is also responsible for design for J&J's other medical companies.



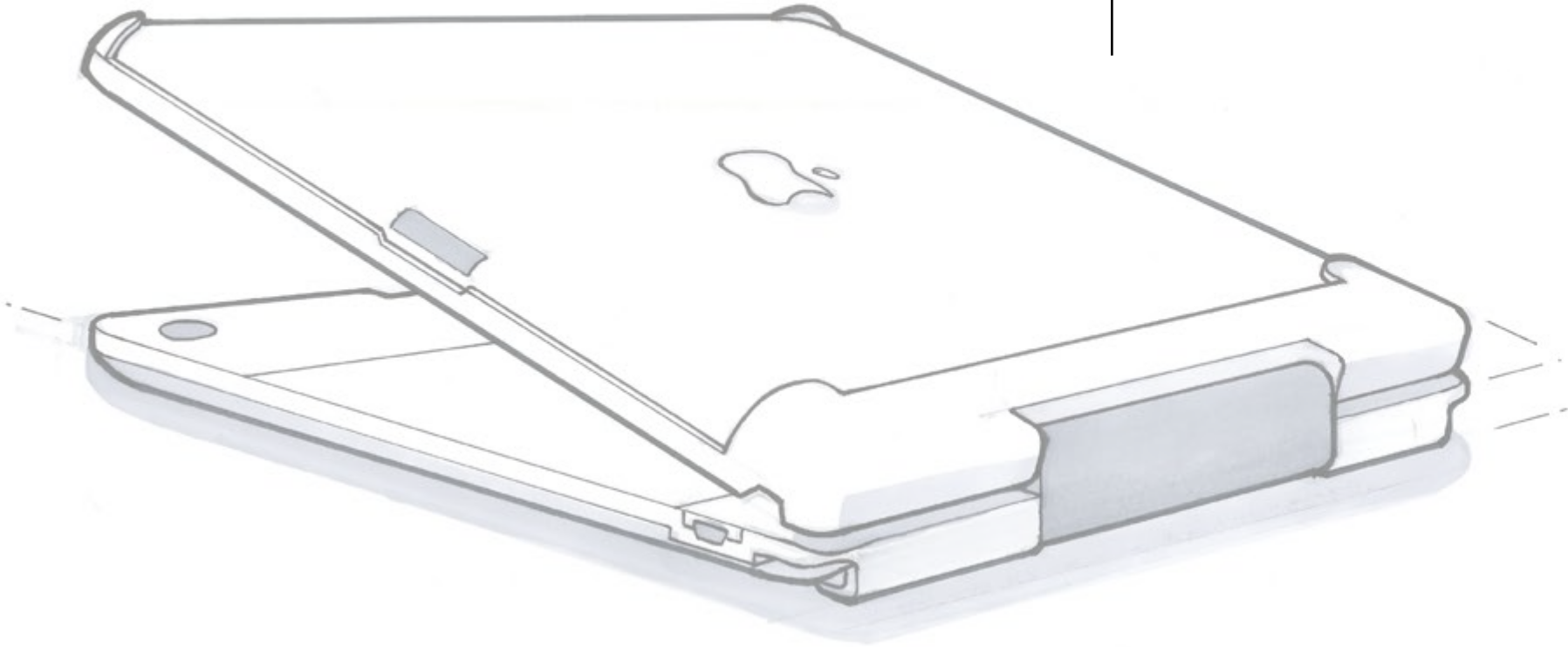


CruxSKUNK - iPad Keyboard Case

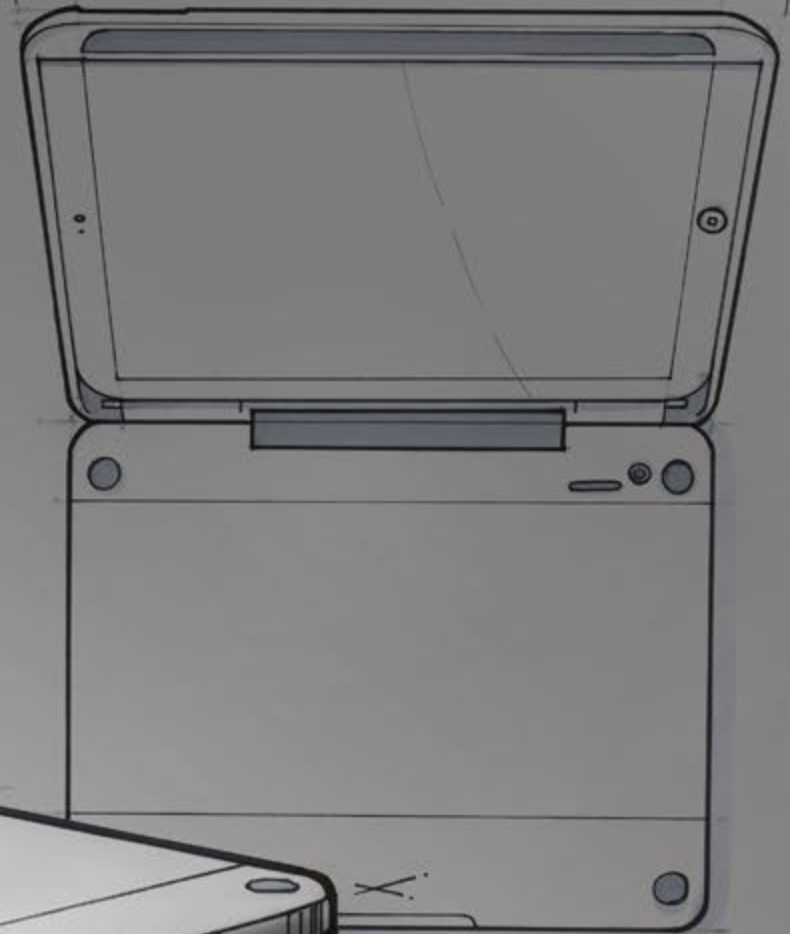
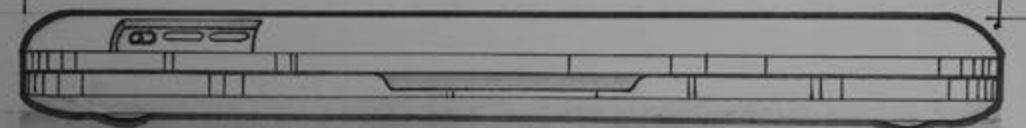
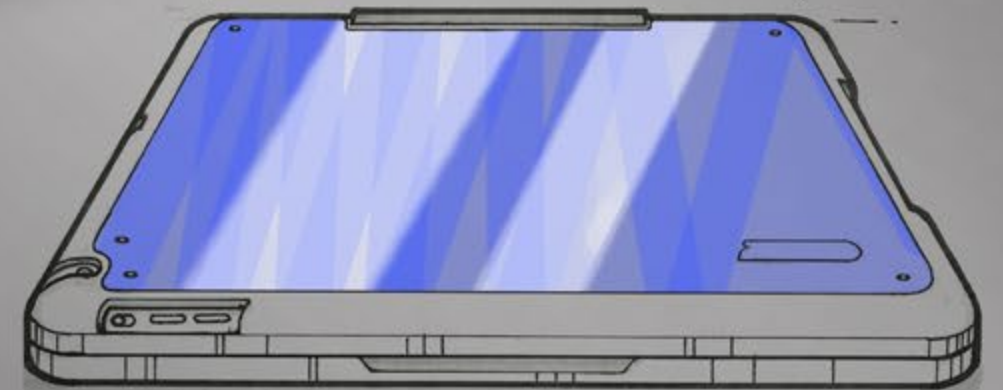


Internship - Summer 2013

As an intern at CruxCase, I helped with the expansion of Crux's product line and visualization of ideas through computer models and hand renderings.



A stylized illustration of a laptop with a tablet screen. The screen is tilted back, showing a reflection of light. The laptop is open, and the tablet is attached to the base. The illustration is in a simple, clean style with bold lines and a limited color palette. The text "TABLET..." is visible in the bottom left corner.





CruxCase for the Nexus 10 tablet from Google

nexus

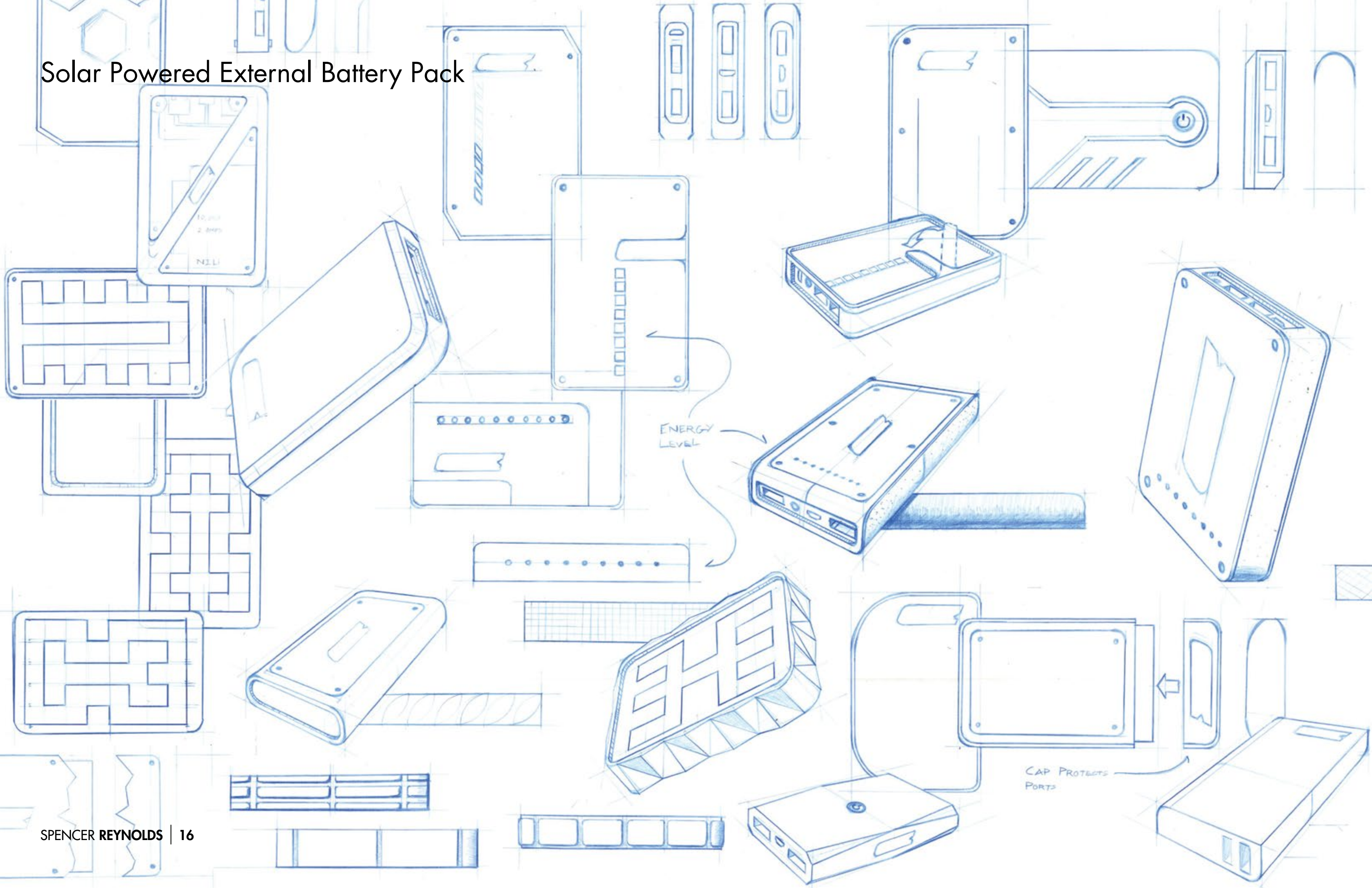


The Bluetooth Keyboard that CruxCase refined now applied to the Nexus 10 Tablet from Google. Switch between carrying, laptop, movie, and tablet mode.

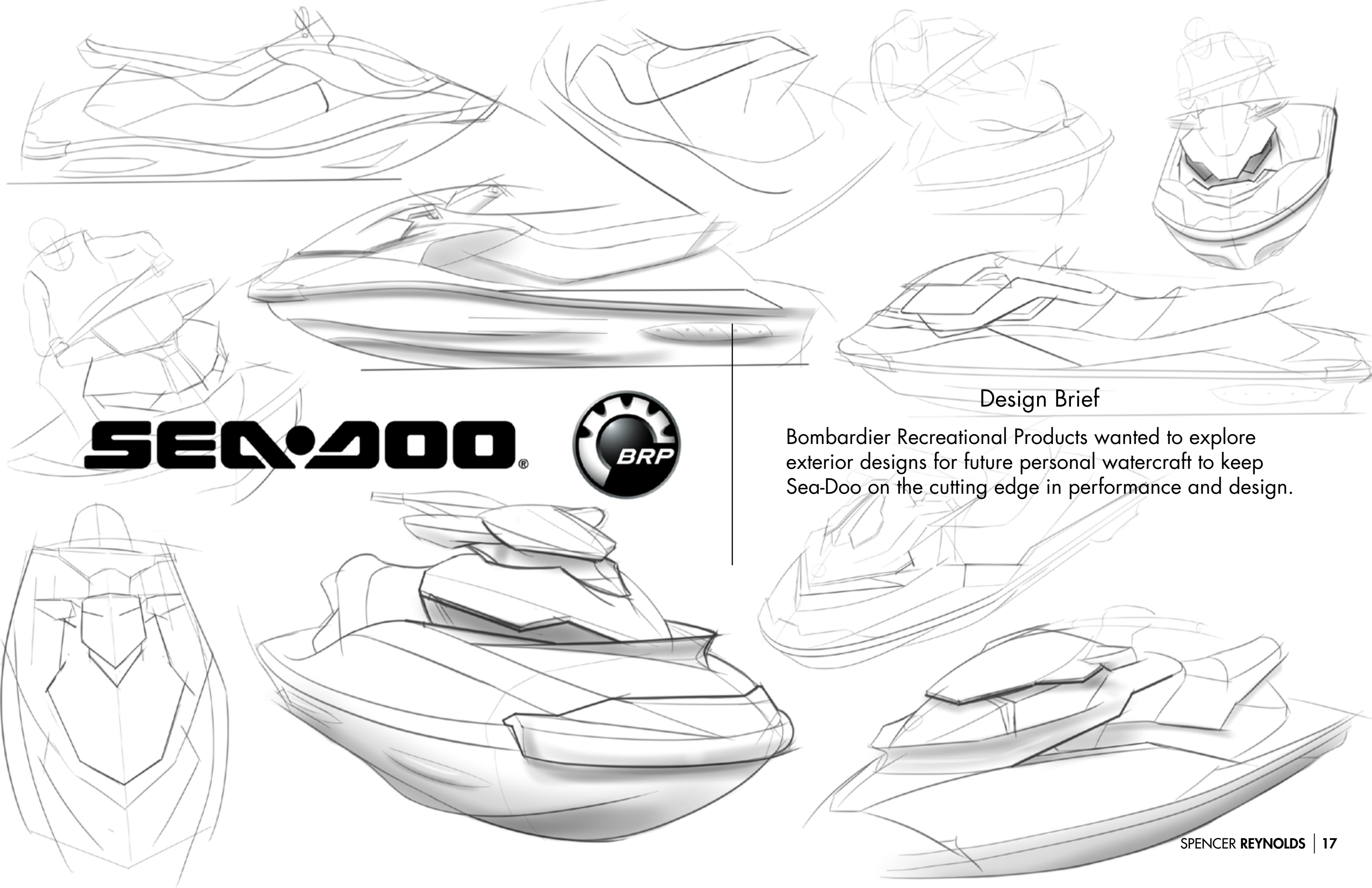




# Solar Powered External Battery Pack







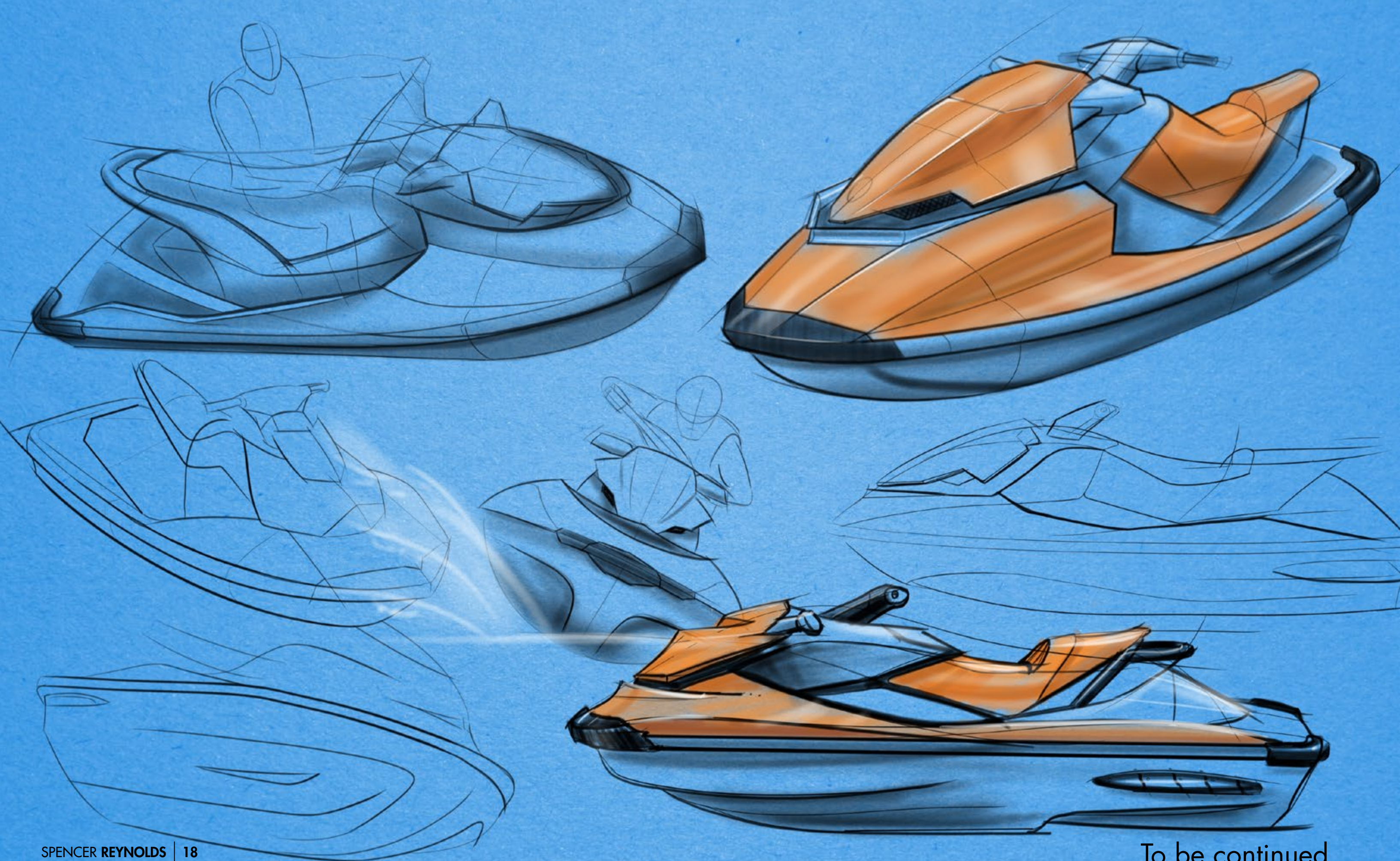
**SEA-DOO®**



## Design Brief

Bombardier Recreational Products wanted to explore exterior designs for future personal watercraft to keep Sea-Doo on the cutting edge in performance and design.



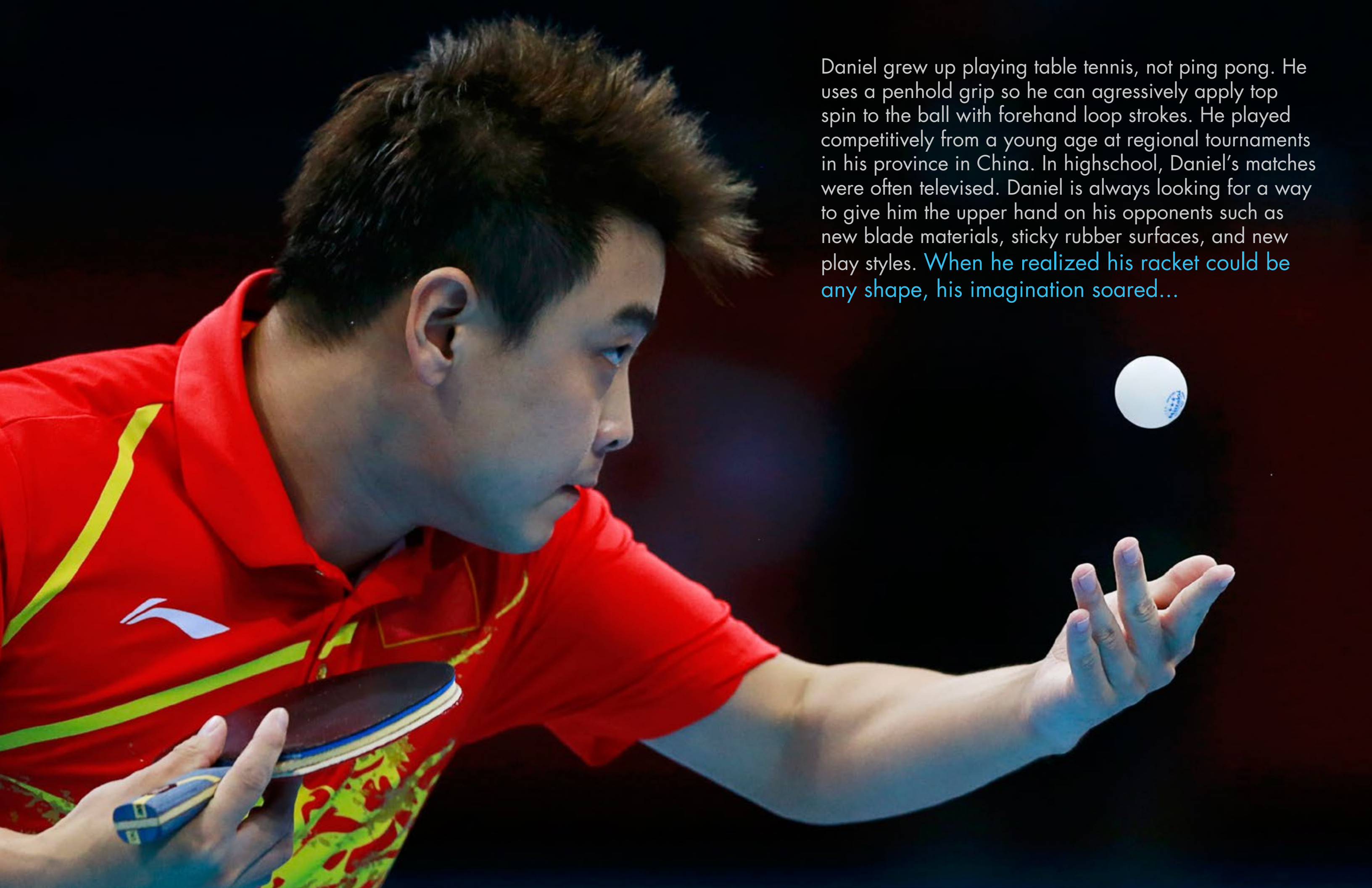






## Design Brief

The International Rules of Table Tennis allow paddles to be any shape, yet we see little variety. Design a new paddle for specific users.



Daniel grew up playing table tennis, not ping pong. He uses a penhold grip so he can aggressively apply top spin to the ball with forehand loop strokes. He played competitively from a young age at regional tournaments in his province in China. In highschool, Daniel's matches were often televised. Daniel is always looking for a way to give him the upper hand on his opponents such as new blade materials, sticky rubber surfaces, and new play styles. When he realized his racket could be any shape, his imagination soared...



## Initial Research

**300,000,000**

People play table tennis worldwide...  
slightly less than the population of the U.S.

**1880**

The year table tennis is believed to have  
been originated by British military officers

**272**

Calories burned in an hour of play...  
about the same as walking 3 miles

**180**

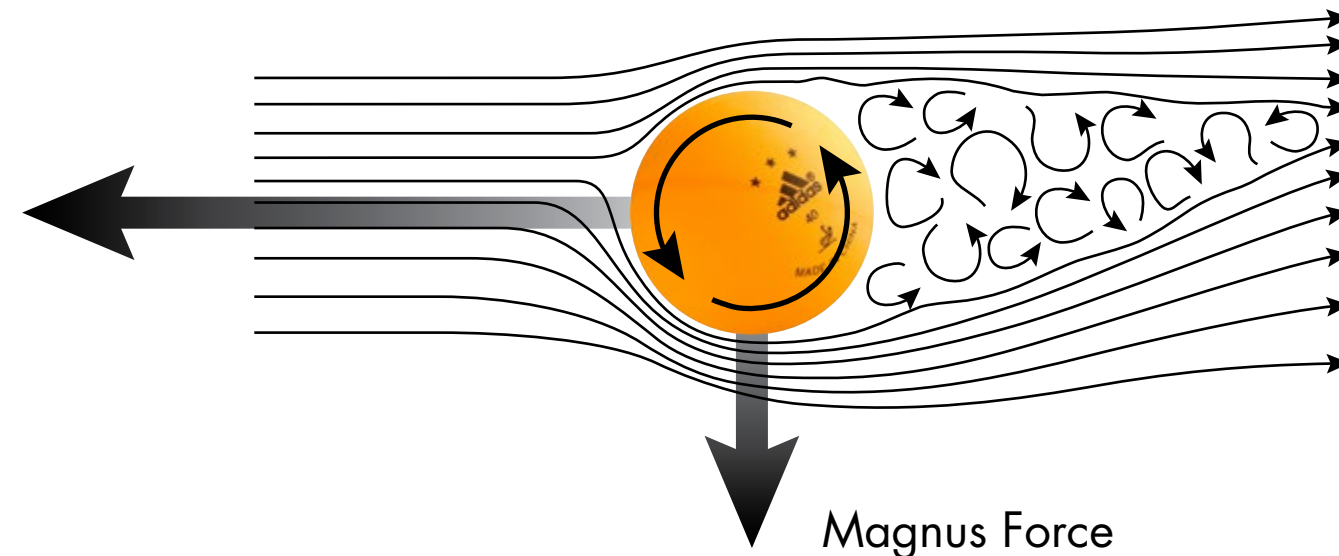
The number of times the ball gets hit back  
and forth during play in a single minute

**50**

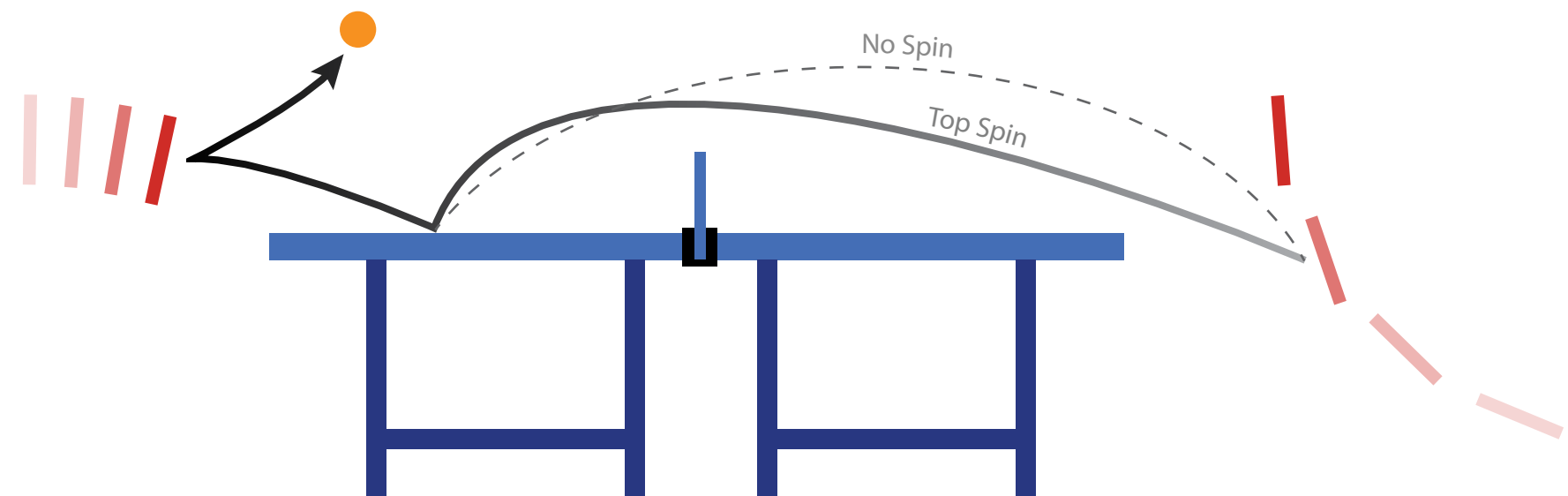
Miles per hour, the speed that the ball  
travels during competitive play

## Spin Mechanics

Aerodynamics of a Ball hit with top spin



Trajectory of a Ball hit with top spin



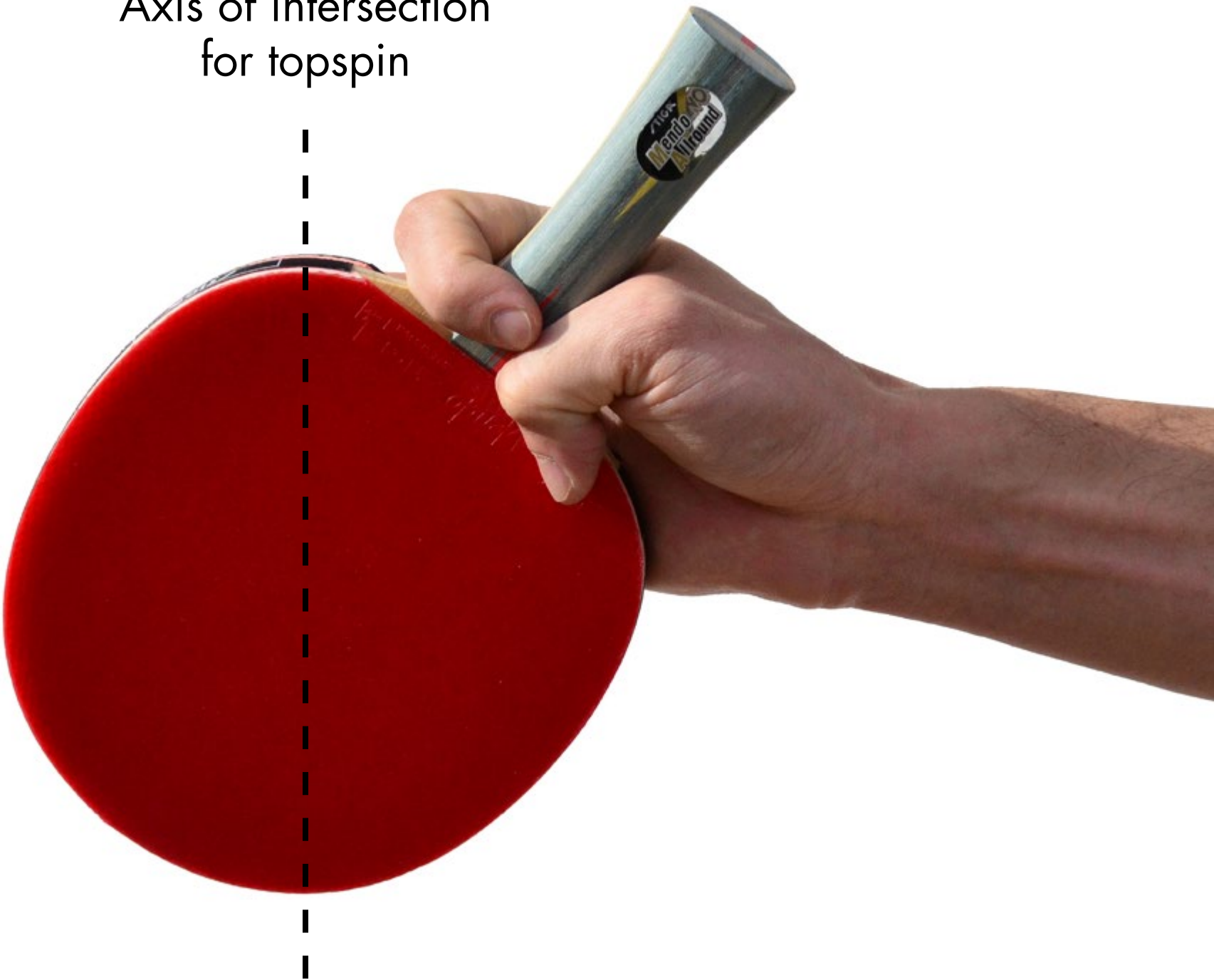
# Research - Play and Observe

After playing table tennis with a variety of players, I observed that players who held the paddle pen-hold style would swing the blade through the ball at an offset angle when applying top spin.

This observation led me to explore the possibility of extending the paddle along this sweet spot for spin.



Axis of intersection  
for topspin



## 2: The Laws of Table Tennis

- 2.4

THE RACKET
- 2.4.1

The racket may be of any size, shape or weight but the blade shall be flat and rigid.
- 2.4.2

At least 85% of the blade by thickness shall be of natural wood; an adhesive layer within the blade may be reinforced with fibrous material such as carbon fibre, glass fibre or compressed paper, but shall not be thicker than 7.5% of the total thickness or 0.35mm, whichever is the smaller.
- 2.4.3

A side of the blade used for striking the ball shall be covered with either



# Experienced Feedback

After playing with my first prototypes with friends and making some adjustments based on their feedback, I went to the Provo Table Tennis Club to get feedback from competitive players who play penhold style.

Paddle A



Paddle B



Andy

"Paddle A has a good grip. It feels very secure to the hand at any point of the swing. I like the idea of the sweet spot extension."



Wu, Yue Zhao

"I like the handle and extension of the handle onto the blade of both paddles. I thought I liked the curved handle, but once I started playing with the straight handle I felt more comfortable."



Ethan

"The handle on paddle A feels better to me than the straight handle on B. I like the edge of the grip where my forefinger can sit."

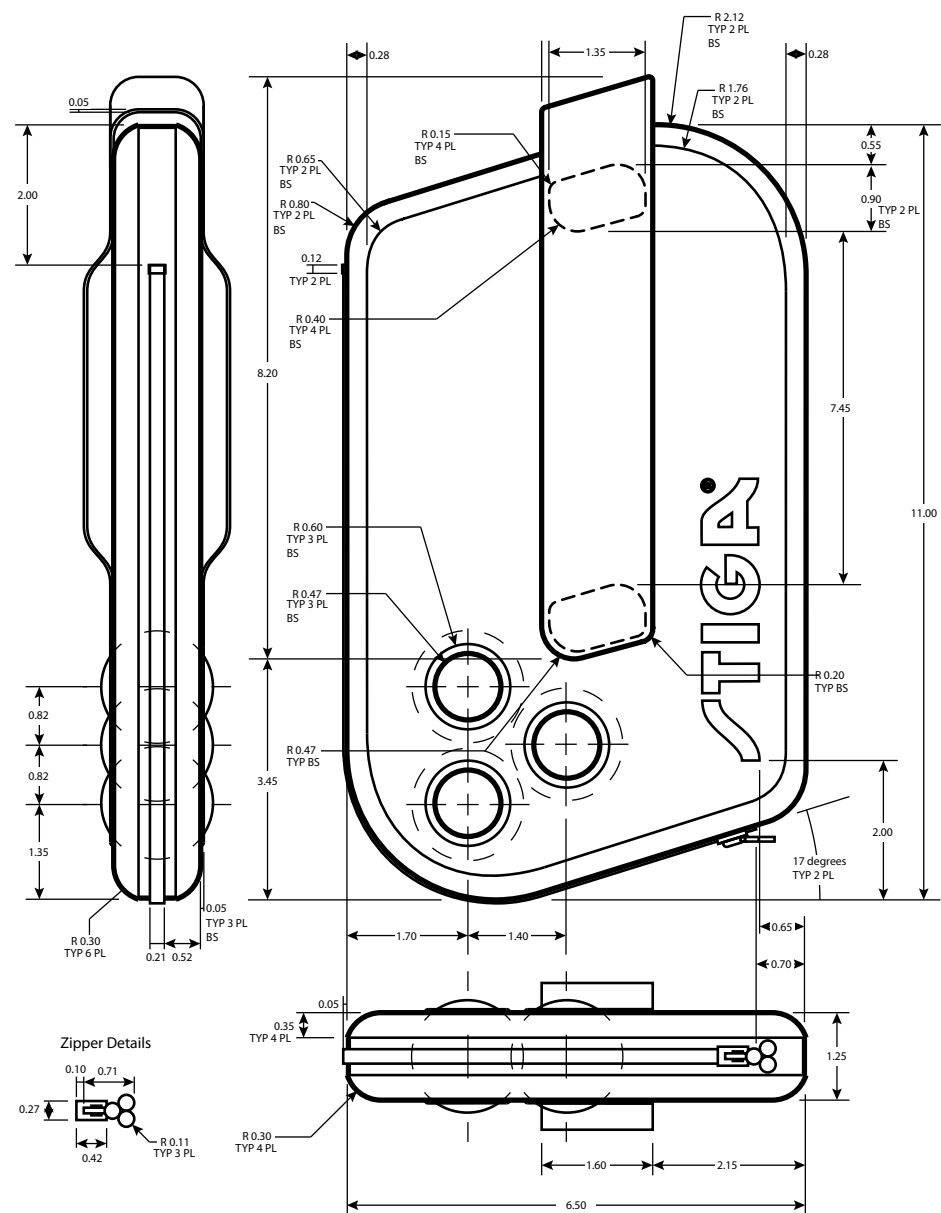


## Feedback Driven Exploration



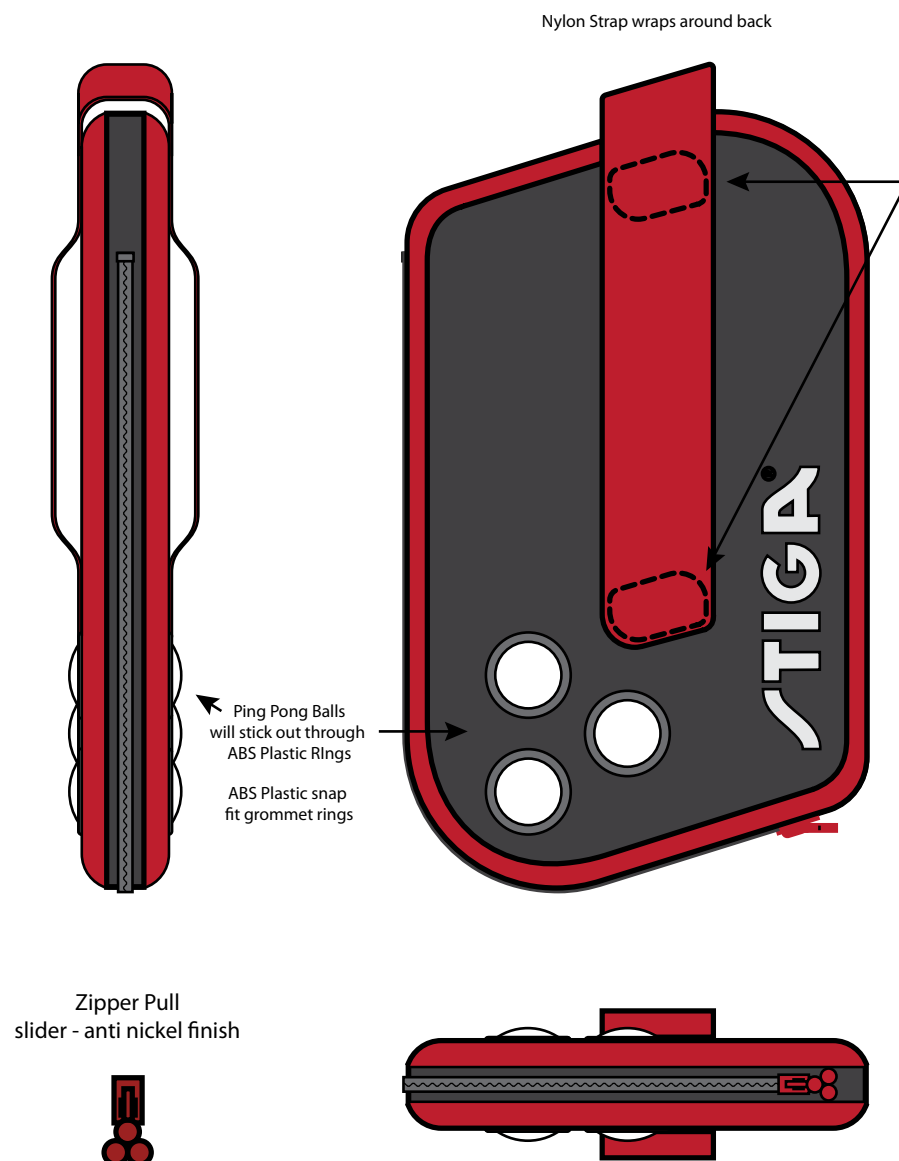


# Paddle Case - Tech Pack



**NOTES:**

1. All Dimensions given in Inches
2. Strap wraps around from front to back
3. All slanted lines are parallel and 17 degrees

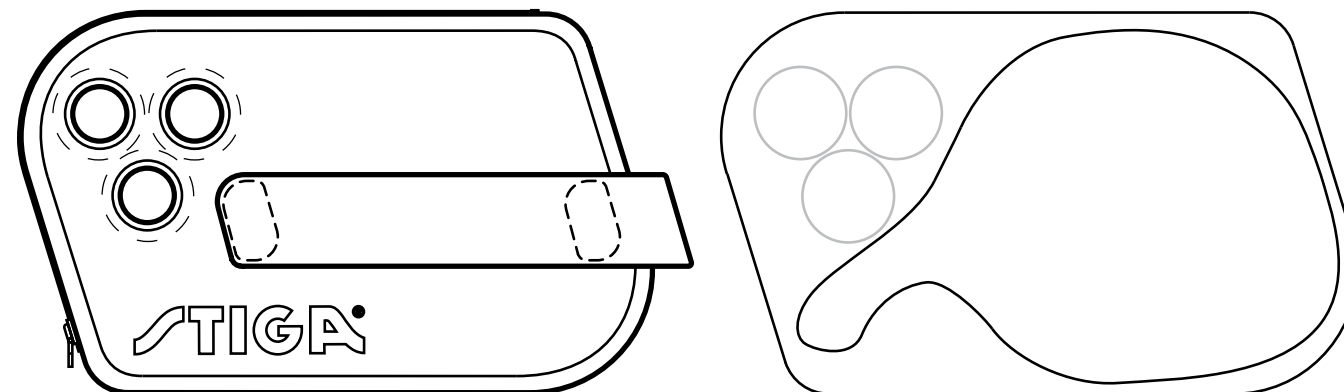


7 Strap is attached with a single needle lock stitch using Black Thread following dimensions given on page 1 of packet

Finishing on all exposed inner  
seam edges ISO# 504  
3- Thread Overedge  
formed by 1 needle thread  
and 2 looper threads

<p>Flat Nylon Webbing -Pantone Black M</p>	<p>Flat Nylon Webbing -PANTONE Fiery Red18-1664 TCX</p>
<p>ABS Plastic ring -Pantone Black M</p>	<p>#5 Nylon Coil Zipper -Pantone Black M</p>
<p>Flat Nylon Webbing -PANTONE Snow White 11-0602 TCX</p>	<p>Zipper Pull -PANTONE Fiery Red18-1664 TCX</p>

Front and Back Logo Embroidery  
Artwork is to scale







# STIGA

## TYPHOON

"SPIN UP A STORM"

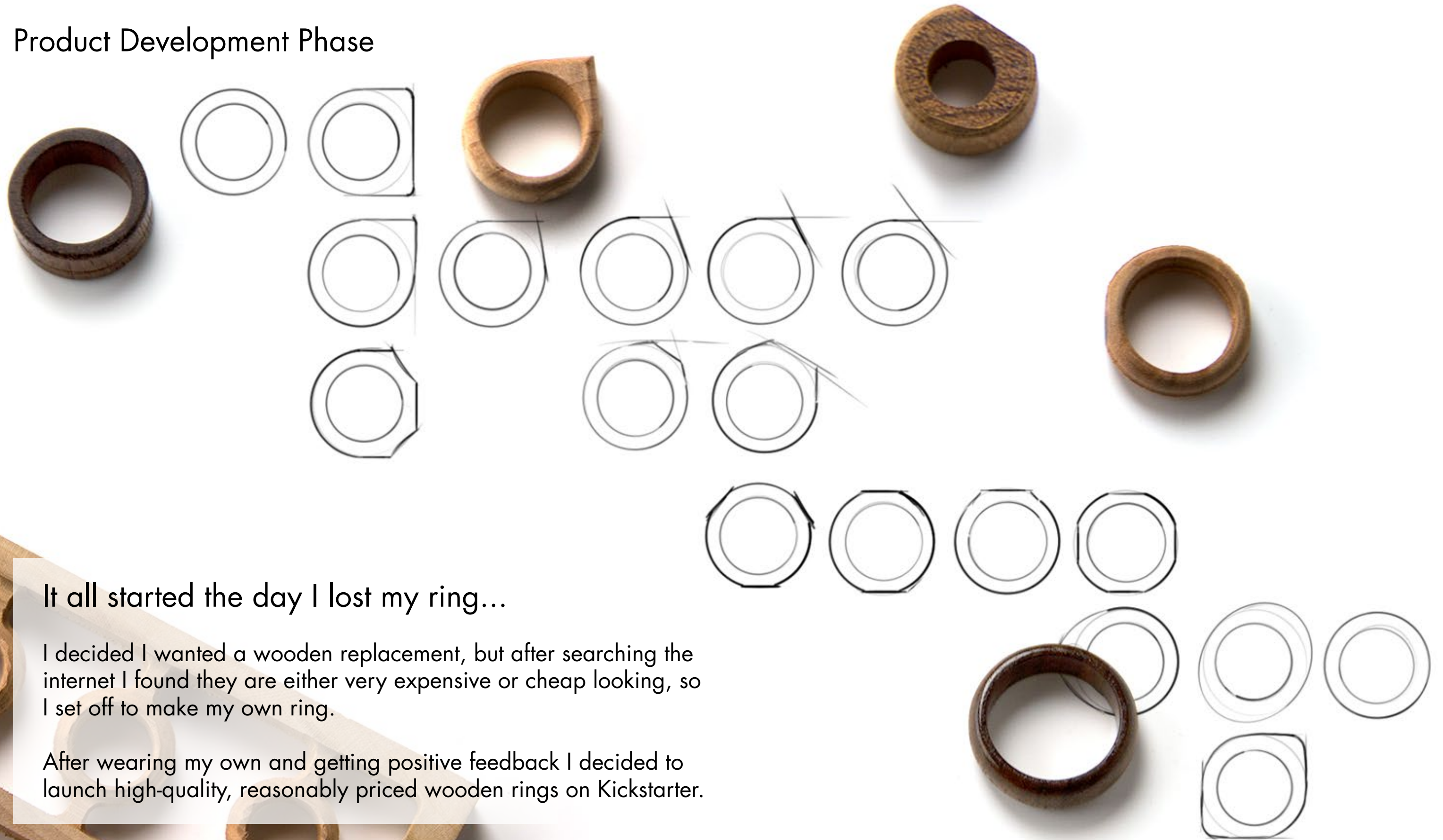




## Design Brief

Crowdfunding gives people the ability to quickly validate whether or not there is a market for their ideas. Design a simple product and launch it on Kickstarter in order to familiarize yourself with crowdfunding.

## Product Development Phase



It all started the day I lost my ring...

I decided I wanted a wooden replacement, but after searching the internet I found they are either very expensive or cheap looking, so I set off to make my own ring.

After wearing my own and getting positive feedback I decided to launch high-quality, reasonably priced wooden rings on Kickstarter.



## Find a Manufacturer in China

I found Josh, who speaks mandarin and has worked in China for 5 years. He found me a manufacturer.

## Background Check

Contacted a few people Josh had previously linked to manufacturers and asked about their work with him.

## Project Details

Emailed Josh details about my rings including pictures, CAD, and instructions.

## Rough Quote

Josh found a manufacturer familiar with precision wood projects and got an estimate using the specs I sent him.

## Send Samples

Sent Josh some of the rings I had made to give him and the factory a better feel for the quality I was seeking.

## First Prototypes

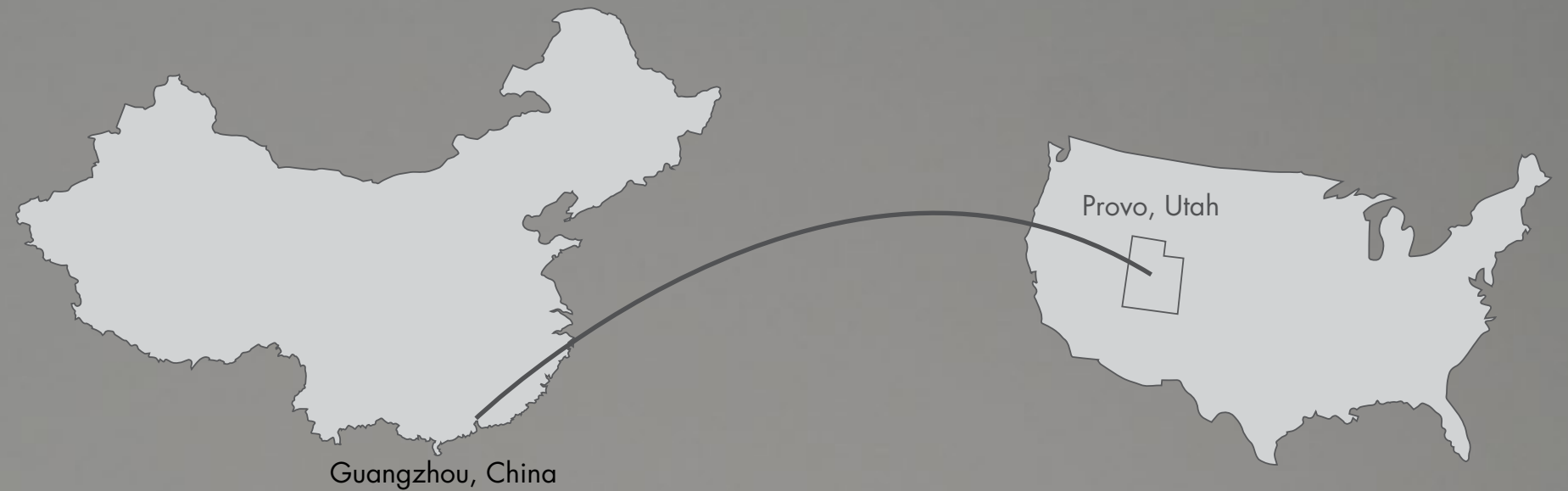
Josh mailed me 12 rings, 6 walnut and 6 cherry, of 4 different sizes.

## Adjustments

Checked the rings to make sure they were accurate to the tenth of a millimeter. They were incredibly accurate.

## Launch

Launched my campaign, unfortunately our marketing leads fell through and the project only raised \$1500.





A photograph of a person's lower legs and feet. The person is wearing black athletic shoes with white soles and black socks. The left leg is a prosthetic, featuring a dark, segmented upper part and a white, foot-like lower part. The right leg is a natural human leg. In the background, a bicycle wheel with a tan tire is visible. The image is overlaid with a semi-transparent grey rectangle containing text.

## Prosthetic Limbs

### Design Brief

Prosthetic usage varies around the world. In the United States alone, prosthetics are a 2 billion dollar per year market. Design a prosthetic device for a specific user.



# Prosthetic Research

**2,000,000,000** dollars are spent each year on prosthetic devices in the United States.

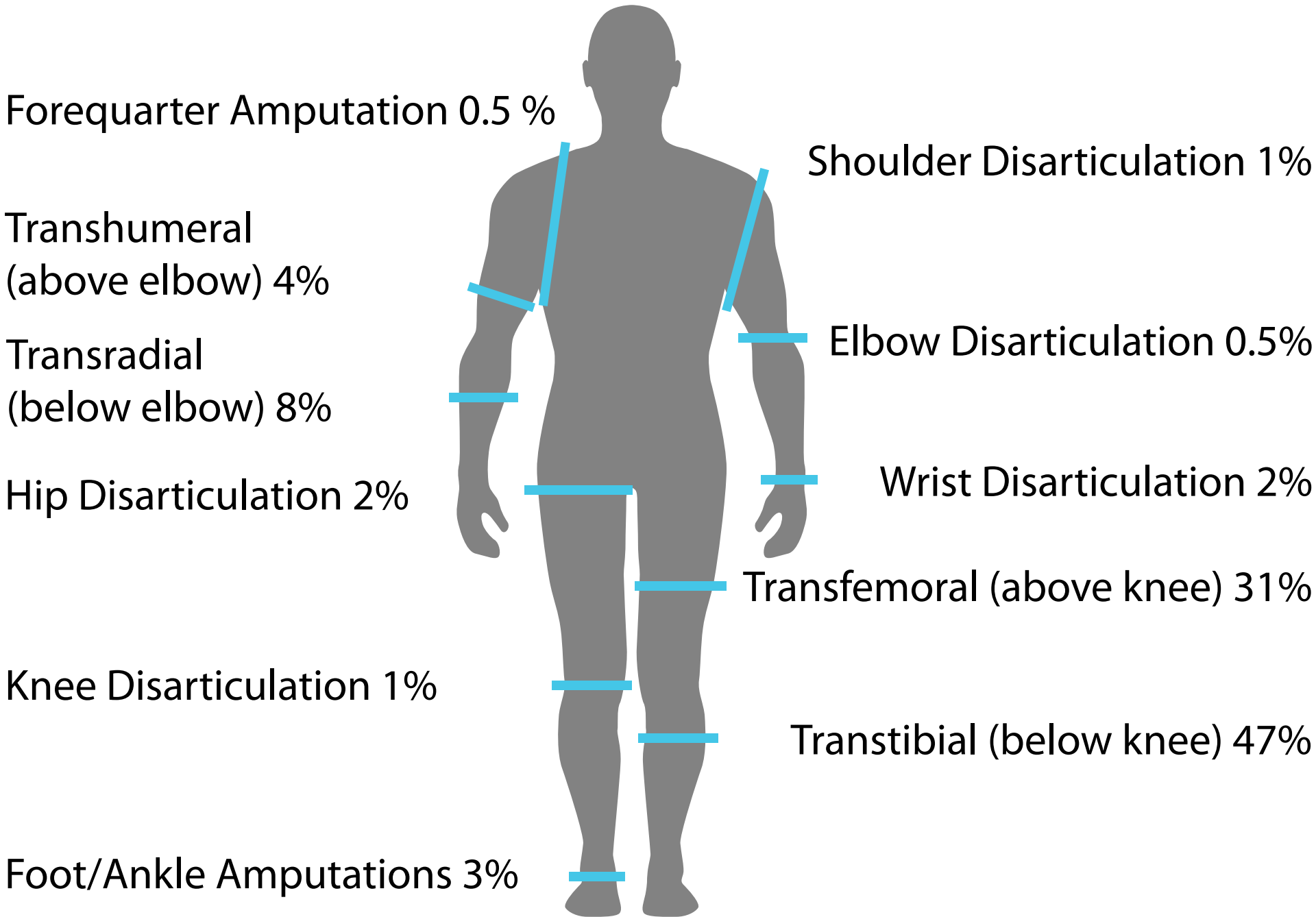
**1,700,000** amputees currently live in the United States. This number is expected to double by 2050.

**185,000** amputations occur per year in the United States. A majority of which are below the knee.



1 Amputation  
Occurs Every 30  
Seconds Globally

## Amputation Type by Percentage





# Anatomy of Trans-tibial Prosthetics

## Liner

Placed over the residual limb, liners provide a better fit and cushioning for comfort. Sometimes liners will include a mechanical pin on the end for locking into the socket.

## Socket

The socket is form fitted to the residual limb. It helps disperse your weight across the surface area of your residual limb. The socket will utilize a mechanical, passive vacuum, or active vacuum to keep the prosthesis attached to your body.

## Pylon

To connect the socket to the foot, a pylon or some other structural support is used. Pylons generally come in two diameters, 30mm and 34mm.

## Foot

The foot of the prosthetic is critical to maintaining a natural gait. The foot needs to transition smoothly from heel to toe. Many prosthetics will have a structural foot with a natural looking overmold to fit a shoe.

An average Transtibial Prosthetic costs \$6,000 - \$8,000 and will last for three to four years before wearing out.

High-activity Outdoor Prosthetics: Both use an Active Vacuum System to secure the socket to the residual Limb. Here we see variation in the foot modules, both shown without a foot shell.

Performance/Running Prosthesis: Shown with a Passive Vacuum System to secure socket on residual Limb



## Concept Inspiration: TED Talks

There's an important difference... between the objective medical fact of my being an amputee and the subjective societal opinion of whether or not I'm disabled. And, truthfully, the only real and consistent disability I've had to confront is the world ever thinking that I could be described by those definitions." Bilateral Transtibial Amputee - Aimee Mullins: The opportunity of adversity



“What’s the difference [between]... the wheelchair with no lights and the wheelchair with lights? The difference is intent. That’s right,... I’m no longer a victim. I chose to change the situation – I’m the Commander of the Starship Wheelchair with the phaser wheels in the front. Right? Intent changes the picture completely.” -John Hockenberry: We are all designers





## End User: Persona

**Ethan Hall** is a confident 24 year-old skater and snowboarder. Growing up he kept busy in the mountains near his California home. After graduating from highschool, Ethan enlisted in the Army and spent multiple deployments in Iraq. His life was changed when an IED exploded next to his convoy and his lower leg had to be amputated...





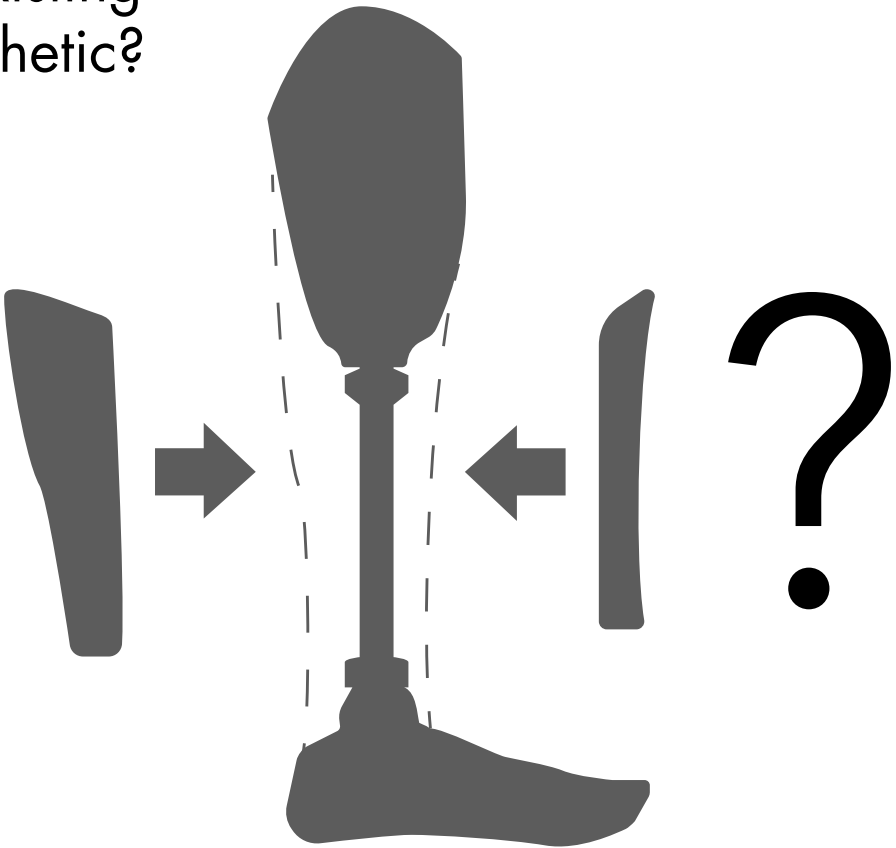
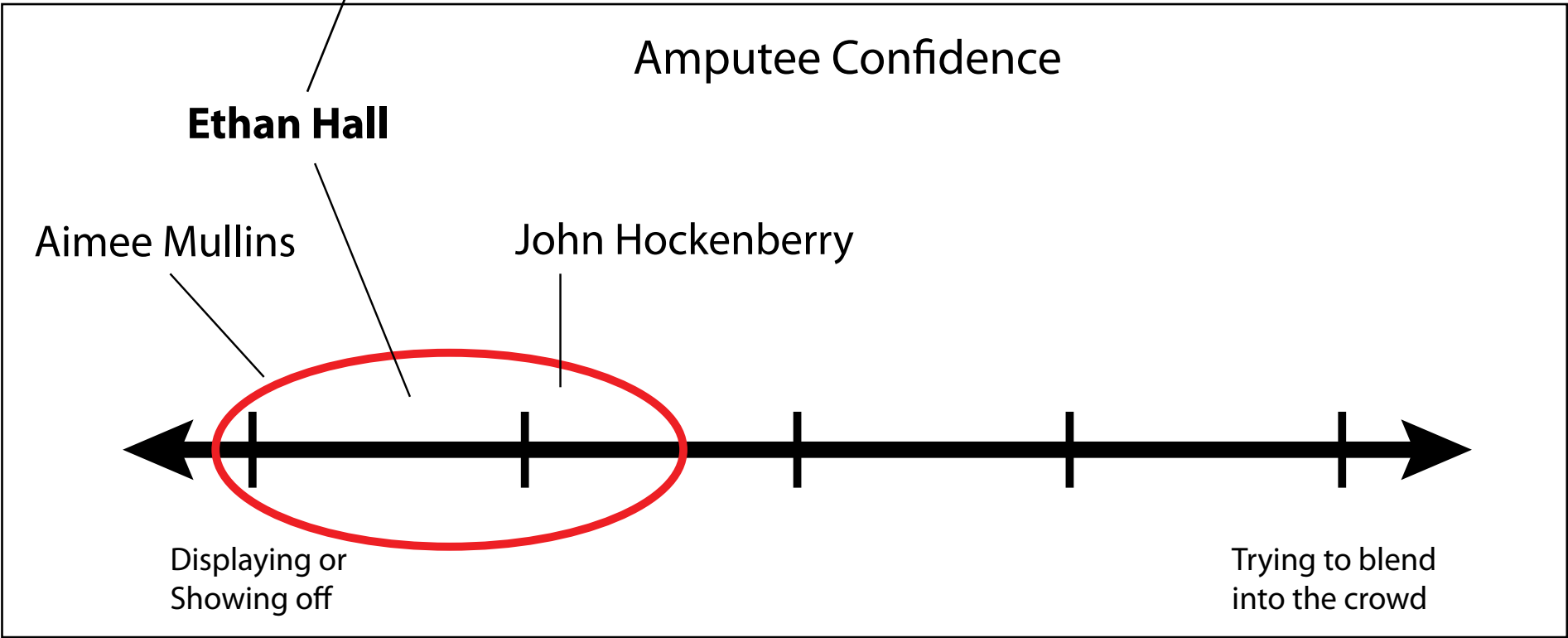
# Ethan's Needs and Case Use Scenarios

## Levels of Use

- 1. In Home - Very Basic, Limited Mobility
- 2. Neighborhood - Used for taking a walk, no sudden change of direction
- 3. Active City - Longer periods of use, can handle quick changes in direction.
- 4. Performance - Specialized for a specific activity, e.g. sprinting, swimming

Ethan Hall hasn't allowed his status as an amputee affect his active lifestyle. He uses specialized prosthetics for extreme sports and for actively moving around town. He comfortably displays his current prosthetic leg while wearing shorts, but is looking for a way to personalize his prosthetic in a way more meaningful to him.

What if Ethan could attach lightweight and inexpensive parts to his existing prosthetic for a quick new aesthetic?





## Design Inspiration: The Hero

I selected Heroes with exoskeleton suits to drive my ideation. From comics as a kid to the recent box office hits, these Heroes are a key part of popular culture for Ethan Hall. Exoskeletons are an appropriate direction because of the relationship they have with the human body in form and function, just like a prosthetic limb. As a military servicemen, Ethan is considered a hero by people across the U.S. because of his sacrifice for our freedom.

Iron Man

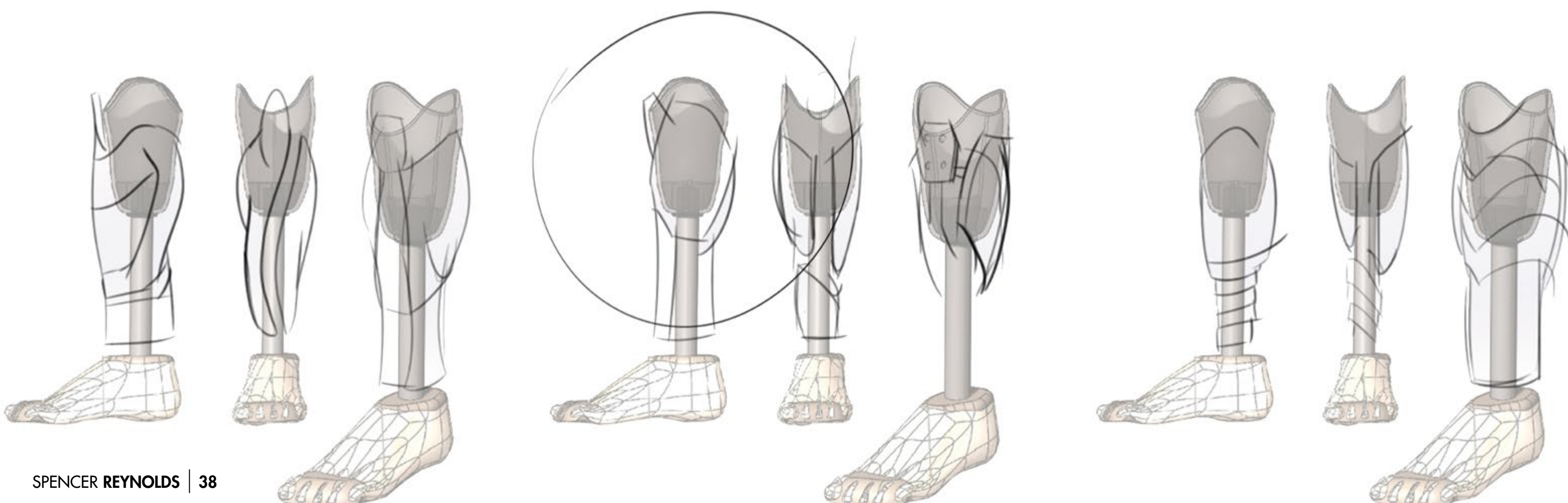
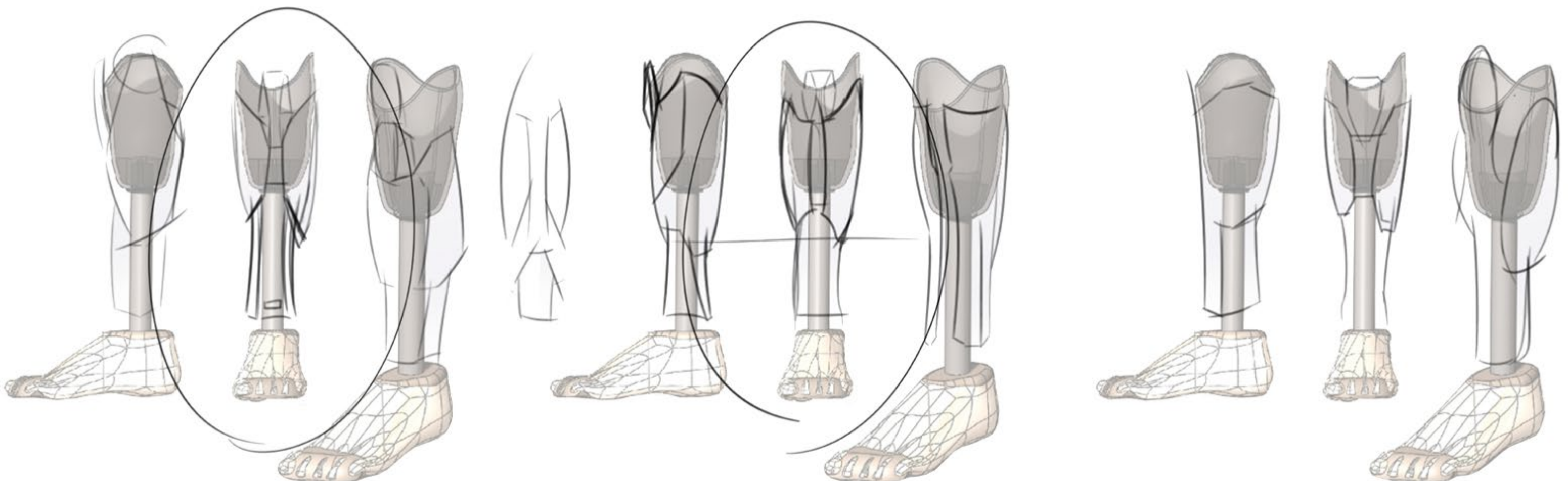


The Master Chief

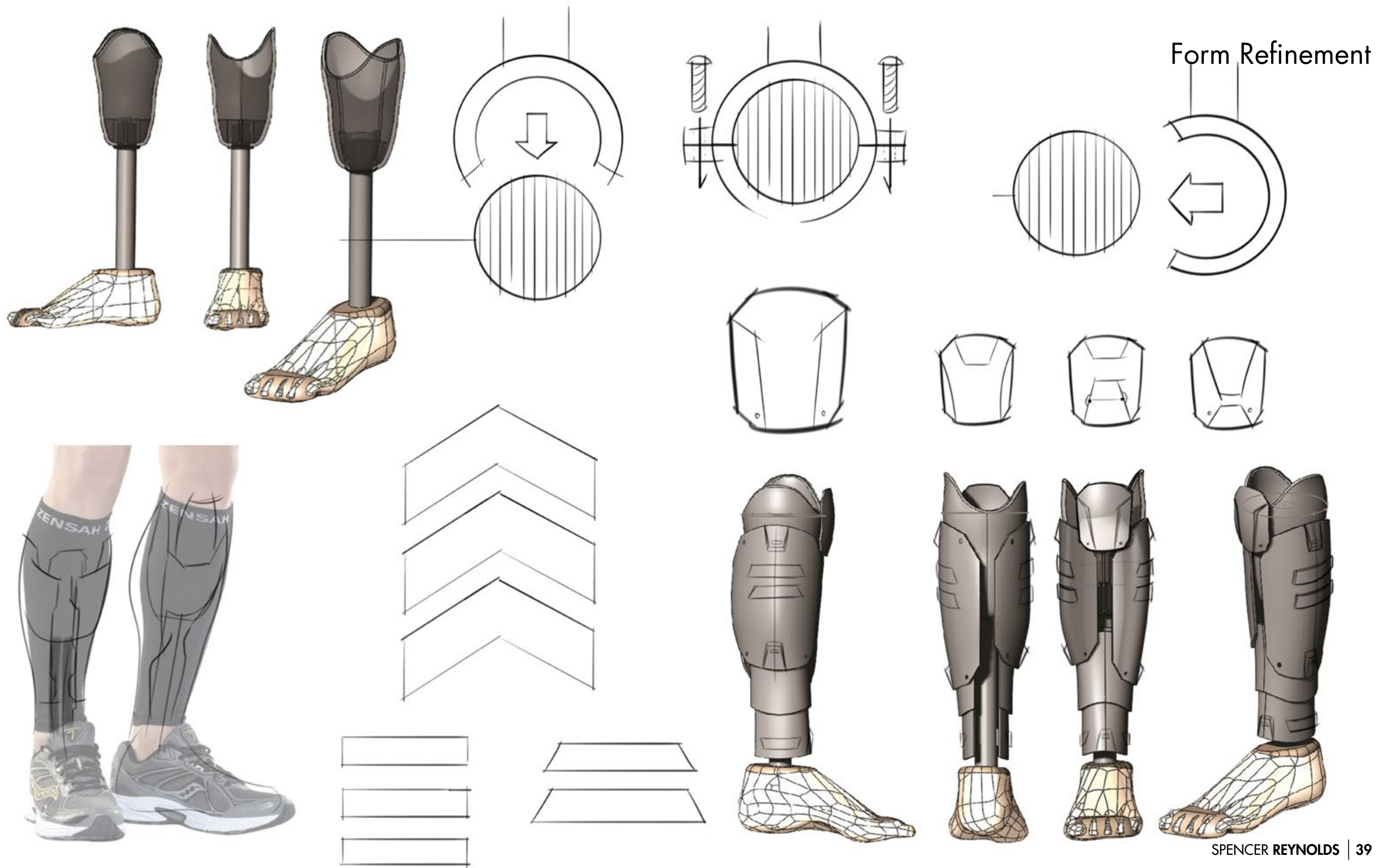


RoboCop















"A hero is an ordinary individual who finds the strength to persevere and endure in spite of overwhelming obstacles."  
- Christopher Reeve





## THANK YOU

To see more work, please visit  
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