

5-1-2018

Embrace

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Selnick, Matthew, "Embrace" (2018). *Program of Industrial Design Capstones*. Paper 26.
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EMBRACE
system

*Matt Selnick
Industrial Design '18*

about me.

When I was 10 years old I got my first skateboard, and since then it has been an integral part of my personality and lifestyle. The history, the videos, the fashion, and the inclusive culture have always fascinated me, and continue to shape my perspective and outlook on the world every day.

In middle school and high school, I began filming my friends skateboarding, and would transfer miniDV tape after miniDV tape of footage to our home computer, where I would spend hours editing video in what would become my first true creative outlet.

Skateboarding led me to explore my creativity, which led to exploring design as a career field, which led me to Philadelphia University. And from here I'm presenting my next creative outlet in skateboarding – my capstone project.

While I started with a very wide scoping base of inspiration and ideas to explore for capstone, I realized that this was not only the perfect opportunity to design for skateboarders, but that it is the opportunity that I've been waiting for; to connect my skillset to my passion. If you follow what you love you'll never work a day on this project.

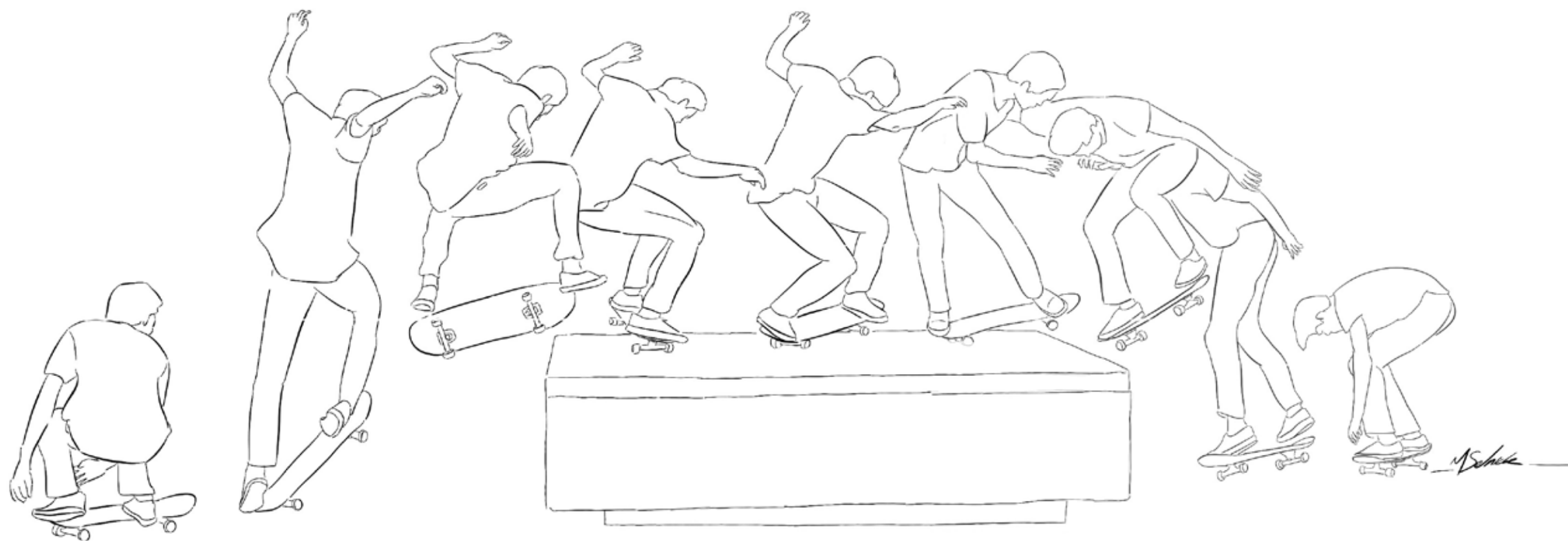
to any student reading this –

Capstone is the most intense design journey that you'll go through at this point in your career, but only if you make it one. And trust me, you're probably going to feel lost until the day that it's done. That's why you just have to **just do it**. Make it until you make it. This is your chance to prove that you can do what other people can't, with the skills they can't teach you in a class or in a textbook.

I want to dedicate this book to Dylan Reider, as well as the countless skateboarders, designers, and friends who inspire me every day to keep doing what I love, and to keep pushing, falling, and getting back up.

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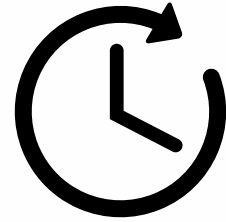


rest easy, dylan.

Skateboarders have some problems.



Loss of confidence when trying new tricks and obstacles



Loss of time that could be spent skateboarding



Loss of ability to perform at best level



Resistance to wearing protective gear because of cultural stigmas



More money spent on physical therapy, gear, and doctors visits.





Every skateboarder's feet get injured.

The Nike Embrace System is a 4-part modular skate shoe system focused on preventing injuries using socks, insoles, a removable brace, and skate shoes to customize your setup as needed, just like your skateboard.





1

Story

They're different from the NFL.

Skateboarding isn't like other sports. There aren't any rules or guidelines to follow. No stop and start. Every surface is your playground. It's a lifestyle; a different way of perceiving the world.



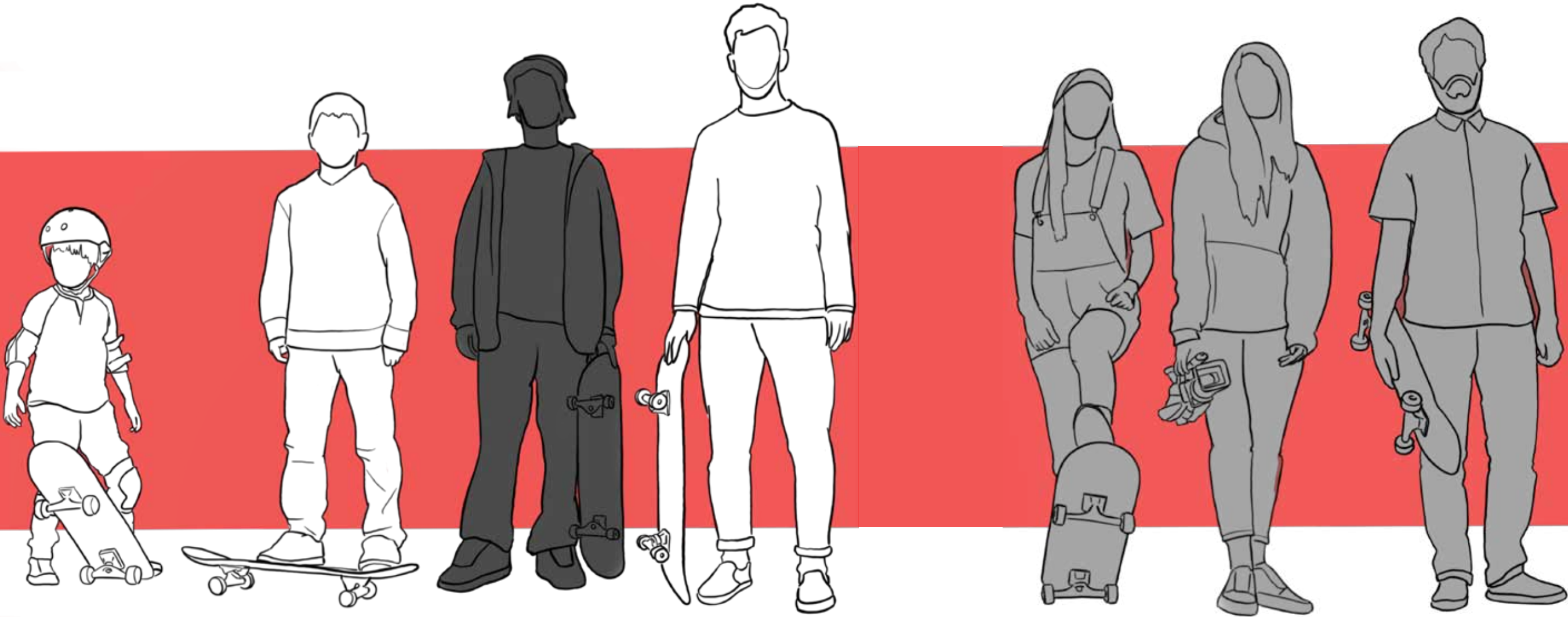


Their Mindset.

It's a constant battle between your mind, your body, and the obstacle. Every trick is a challenge that has a creative way of being solved and perfected, through constant, torturous repetition, followed by an instant rush of intense adrenaline, accomplishment, and drive.

It's an addiction.

This is who they are.



Young Children
5 - 8

Adolescents
9 - 11

Teenagers
12 - 17

Young Adults
18 - 30

Young Women

Older Adults
30 - 50+

In 2006, 71% of skaters were in the 12-17 age demographic. Today only 45% are 12-17.

Female skaters are the larger growing demographic, and adults are skating longer than ever, but industry companies have yet to address these growing parts of the consumer base.

Most people assume the average skater...



doesn't follow rules.



is a 13 year old boy.



is not considerate
of their purchases.

But actually, they...



are incredibly creative.



are increasingly diverse
in age and gender.



have significant product
knowledge and know
what their needs are.

They get injured. A lot.

Skateboarding is growing faster than any other sport or recreational activity – Along with it come increased rates of injury.

It's the expected cost of playing the game. A constant risk that you take going towards every trick. They're signs of battle, failure, endurance, and of non-quitting spirit.



Dr. David Sales – Next Level Rehab

Most skaters hate being called “athletes,” but when a pro breaks his kneecap or has to film for a major video at age 50 with a torn MCL, he’ll head to doctors who specialize in athletic rehab.”

– Dr. David Sales, Next Level Rehab

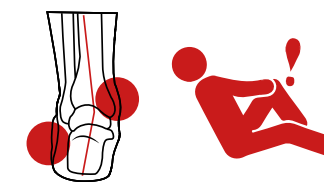
“I think that skateboard rehab will be replaced by injury prevention. And with skateboarding progressing at this level, there’s no doubt that everybody’s going to continue getting hurt. Unless we prevent the injury. That’s the goal.”



125,145

people were treated in U.S. emergency rooms for skateboard-related injuries in 2015.

Brandongaille.com



42%

of these injuries treated were to the lower extremities.

Transworld Business

Born from rebellious counter-cultural roots of surf and urban street cultures, skateboarding **doesn't fit any categories or comparisons**. It's fundamental non-compliance has driven it to become a huge inspiration for fashion and **inclusive** modern culture.



Skateboarders want to embody the style and freedom that defines our culture, which often means **disregarding protective gear**, and creating a **stigma that looks down upon it**.

“I always either get tweaked, bumped or bruised every time I skate. Let’s say 100 [injuries] if you need a number.”

When you boil it down – skateboarders think that protective gear makes them look weak.

Skateboarders don't just "break in" shoes. They break shoes.

Nike SB Koston Hypervulc: 20-30 sessions (1-2 months)



"Shoe-Goo" epoxy required to extend the life of the toecap, but it is still worn through quickly.

Back foot shoe remains almost new while dominant foot shoe receives most of the wear. This destruction will also happen on the back foot shoe if the skater also skates switch stance often.

Shoelaces have been replaced with spare laces due to being ripped through.



Laces ripped from flip trips and ollies, reducing lockdown and tight fit in vamp area.

Ripped sidewall and logo stitching from ollies and cruising.

Most pairs of skate shoes are thrown away because of the damage to the worst of the pair, which is generally mostly on the dominant (or forward-placed) foot. This contributes significantly to the amount of waste created from skate shoes, and means that as the shoe is being destroyed, you lose the structure and stability that the shoe provided initially. The quick rate at which this wear happens, which can be different for every skater, creates the short lifespan of skate shoes, and shoes that lack quality material and detail placement will last even shorter lives.



Footprint

Takeaways

Owned and operated by skateboards
Footwear brand new to the market
Market heavily to the athletic side of it
Increase balance, stop the arch from
collapsing (overpronation)
Prevent arthritis from uneven cartilage wear
Increase performance time

"the problem with off-the-shelf products is that they're based on everyone's foot being the same - the problem is that everyone's foot isn't."
- Dr. Pedowitz, The Rothman Institute



Supportive products exist, but are generalized for many sports, and don't cater to a skater's performance specifically.

In addition, all shoes are shaped differently.
And people's feet.
And ankle braces, socks, and insoles.
In some cases, more damage can be done than good.

Other Insoles

Impact Support Gel
ETU's Impact Support Gel is set in the heel cavity for the shock area

Forefoot Flex
The Creases are applied to the forefoot area of the foot

Arch Support
Specifically designs, accommodate the arch of various heights

Why doesn't everything work together?



Takeaways

gender
as Pro models
incorporate different materials

Breatheable mesh lining and arch support
"Primo Pad" - flexible and firm TPU to help support from slope and over-rotation of foot
Forefoot flex technology
Owned and operated by skateboards

**They just want
to keep skating.**



So why do they let themselves get injured so easily?



if every skater's feet are different...



then why can't you customize your shoes like your skateboard?

!

*A modular skate shoe system,
for personalized protection
and style.*



The Dream Team

Textile and Product Development



Mark Sunderland

R.J. Reichlin High Performance Apparel Term Chair
Senior Fellow-IEHP
Textile Engineer+Strategist
Director- M.S. Global Fashion Enterprise
+ B.S. Textile Material Technology

Mark Sunderland is a performance apparel expert, textile engineer and the Robert J. Reichlin High-Performance Apparel Chair at Philadelphia University. With many years of industry experience consulting with and developing yarns and products with companies like Nike, Under Armour, the U.S. military, the U.S. Olympic Women's Rowing team, and many more, Mark became an invaluable source of information, guidance, and sponsorship to the project.

I reached out to Mark to not only learn more about the capabilities for textile innovation within the footwear space, but to see what we could do to address the problems that I had identified. We jumped right in.



Regan Marriner

B.S. Textile Design, Current M.S. Textile Design student

Regan Marriner, a Textile Design graduate student at Jefferson University, has focused her undergraduate degree in Textile Design around performance, and designing fabrics and prints for sport. Regan had experience working with Brooklyn ShoeSpace and developing die-sublimated fabrics in the past, which would become a very helpful resource for my project's development.



Michael Bielawa

Junior Industrial Design student

Mikey, a life-long skateboarder and avid skate-shoe addict, assisted me in the design process and model-making, helping to bring the project to reality.



Rodney Sigmon
Manufacturing Solutions Center
Textile R+D Specialist



Jason Wilkins
Innovaknits, LLC
Managing Partner

Project Development



Tod Kramer
ID Professor
Bluekiwi Designs



Mark Havens
ID Professor
Mark Havens Photography
+ Graphic Design



Marcia Weiss
Textile Design Professor



Mike Leonard
Dean of DEC College
Jefferson University
ID Professor



Janet Brady
Professor of
Materials Technology
Grundy Material Testing Lab

On campus, I connected with and gained project insight from my resources and professors, which allowed me to fully realize and flesh-out my concepts into the design development stage.

Medical and Health Mentors



Dr. Pedowitz, MD
Rothman Institute
Associate Professor of
Orthopaedic Surgery
Thomas Jefferson Medical
College

Monique Chabot, OTD, MS,
OTR/L
Assistant Professor
Occupational Therapy
Jefferson University

Mikael Avery, MSOT,
MArch, BSLA
Adjunct Professor
Industrial Design
Jefferson University

Jeroen Stam
Skateboarding Physiotherapist
@Skateboardingphysio

Matt Beare
The Daily Push - UK
Physiotherapy Student

To impact skateboarders' health positively, I needed to gain a strong understanding of the issues at hand, and validation that I was on the right track. These contacts provided a significant amount of perspective and guidance with their expertise.

Footwear Design



Nathan VanHook
Sr. Creative Director
Nike

Alan Lugo
Bill of Materials Manager
Merrell
(Wolverine Worldwide)

Ronnie Irani
Former Prof. Cricket
Player - Essex County
Cricket Club
Founder of OrthoSole

Neil Kwiatkowski
Industrial Designer II
Smart Design

Ian Cooke
Footwear Designer
Footprint Footwear

Carter Agvent
Footwear Designer
Cole Haan

In order to expand my knowledge on industry methods of design and manufacturing, as well as project mentorship and advice, I connected with many professionals all across the footwear and design industry.

Material and Industry



Matthew Hennessy
Sales Manager
Ortholite

Derek Wilson
Business Dev. Manager
MatPlus Inc.

Nathan Norley
Sales Manager
Hologenix LLC (Celliant)

Matthew Bodoff
Sales + Account Manager
Ultralon Foam USA

Matt Pennington
Global Sales Director
MatMarket (Clarino)

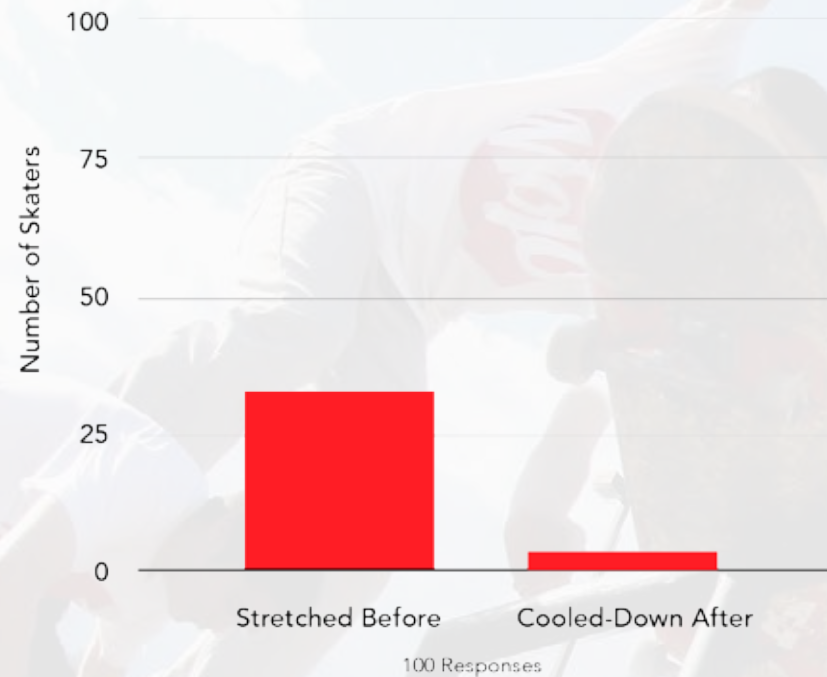
Throughout the project, I reached out to many companies and brands to not only gain insight on my project and what I was developing, but also to sample their materials. I was able to meet some of this network during my trip to The Materials Show in Massachusetts as well. These contacts served as a great resource throughout the project, and provided integral insight into the design of each product.



2

Consumer Research

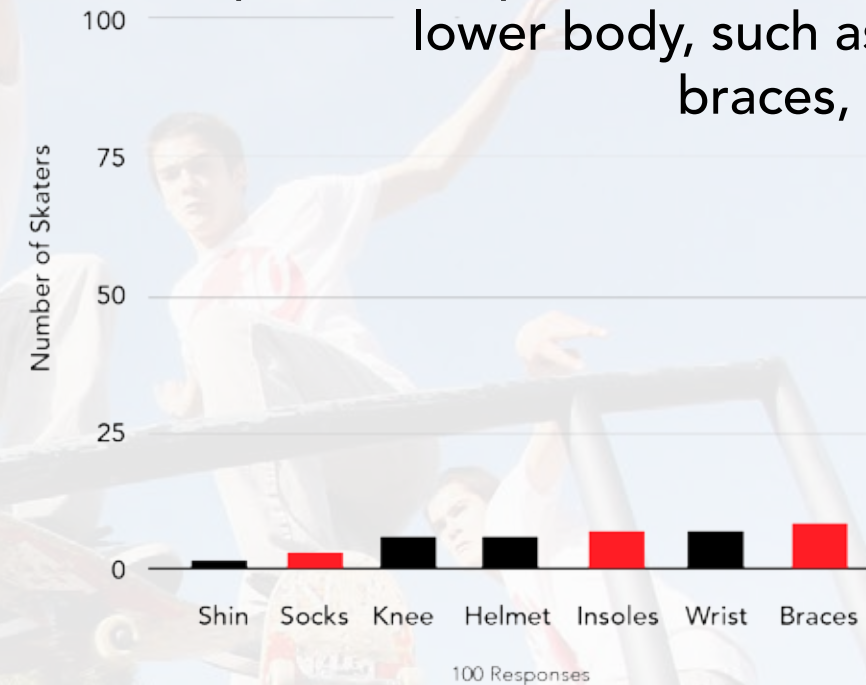
In order to gain a wider scope of opinions from skateboarders and to back up my initial surveying, I conducted additional survey questions online and in person in order to gain insight into the problems that the culture actually faces.



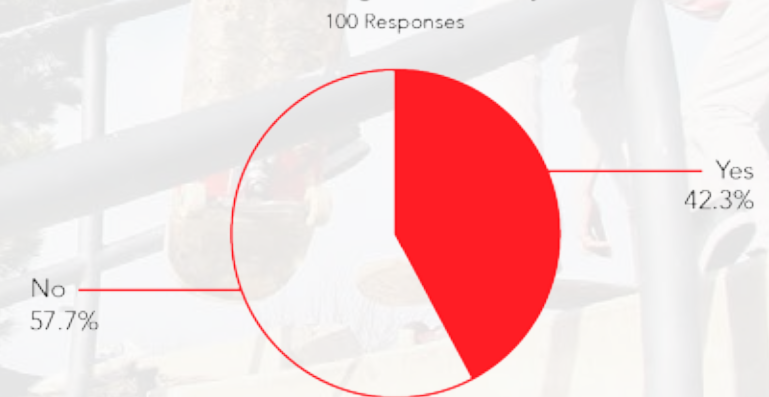
Only **33%** of skaters polled warmed up, while **3%** did anything to cool their bodies down after skating.

Unlike other athletes, few skateboarders care to warm up before or cool down after skating. This can lead to repetitive stress and strain injuries that could otherwise be prevented.

Less than **10%** of skaters polled purchased protective gear for their lower body, such as insoles, braces, or socks.



Have You Visited A Doctor For Skateboarding-Related Injuries?



Due to their rebellious attitude, most skaters prefer not to seek treatment, or to continue skateboarding through their injuries, making them worse.

Key Insights – Supportive Gear

After surveying online, I wanted to talk to skaters in person, and hear more about what they had to say about the supportive gear they've tried.



Social Stigma and Pressures

"I'd want the ability to hide the safety or make it less uncomfortable. Easier accessibility."



Ankle Braces

"The [braces] add more weight so its harder to maneuver. I don't want to wear them even though I might get injured..."



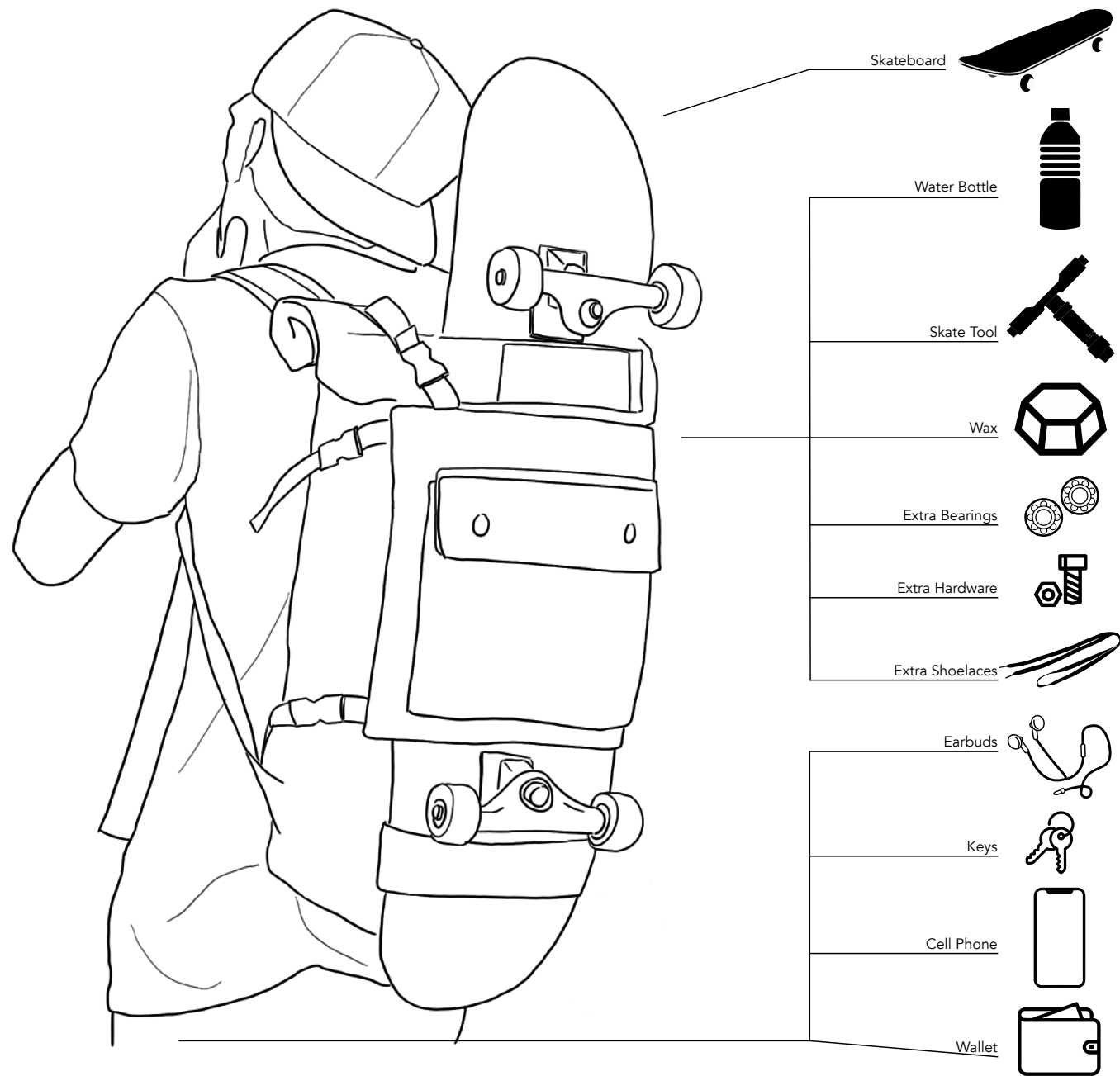
Shoe Insoles

"The insoles I bought fit awkwardly into my new skate shoes, so I feel like they won't help."

Social Stigma and Pressures

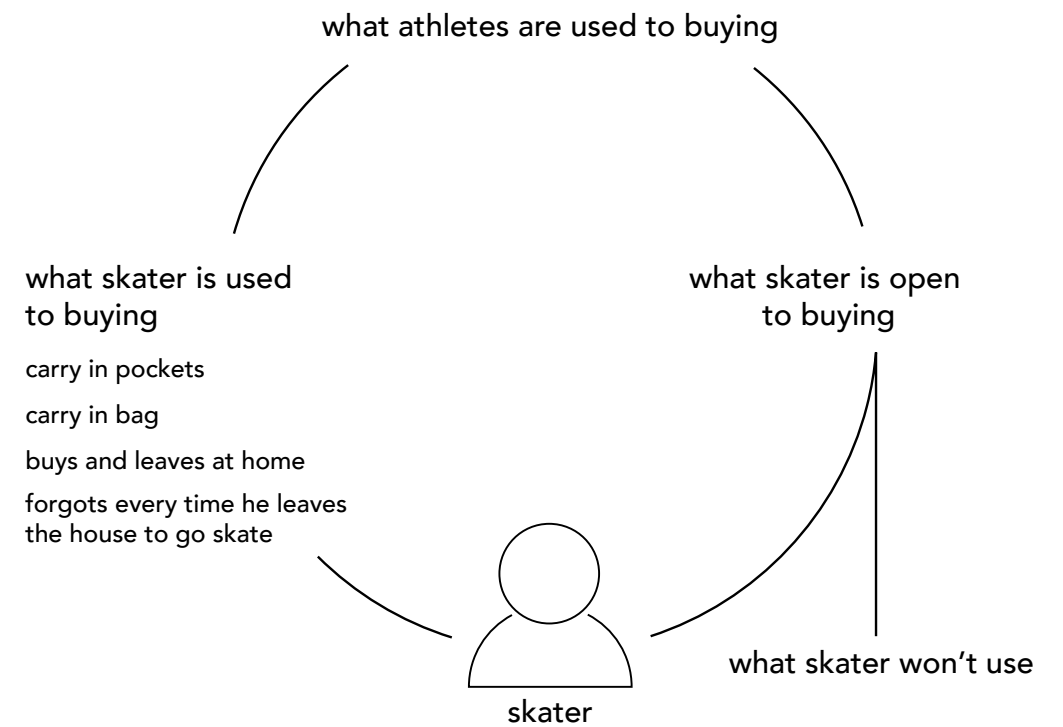
"If more people skated for themselves rather than trying to fit in to impress others, it would be easier to sell them gear."

I used these insights to address specifically the problems that skateboarders had with their footwear, and the protective gear that they'd tried to use in the past. From here I pulled together my survey responses and conclusions from interviewing skaters to define the best way to create a solution.



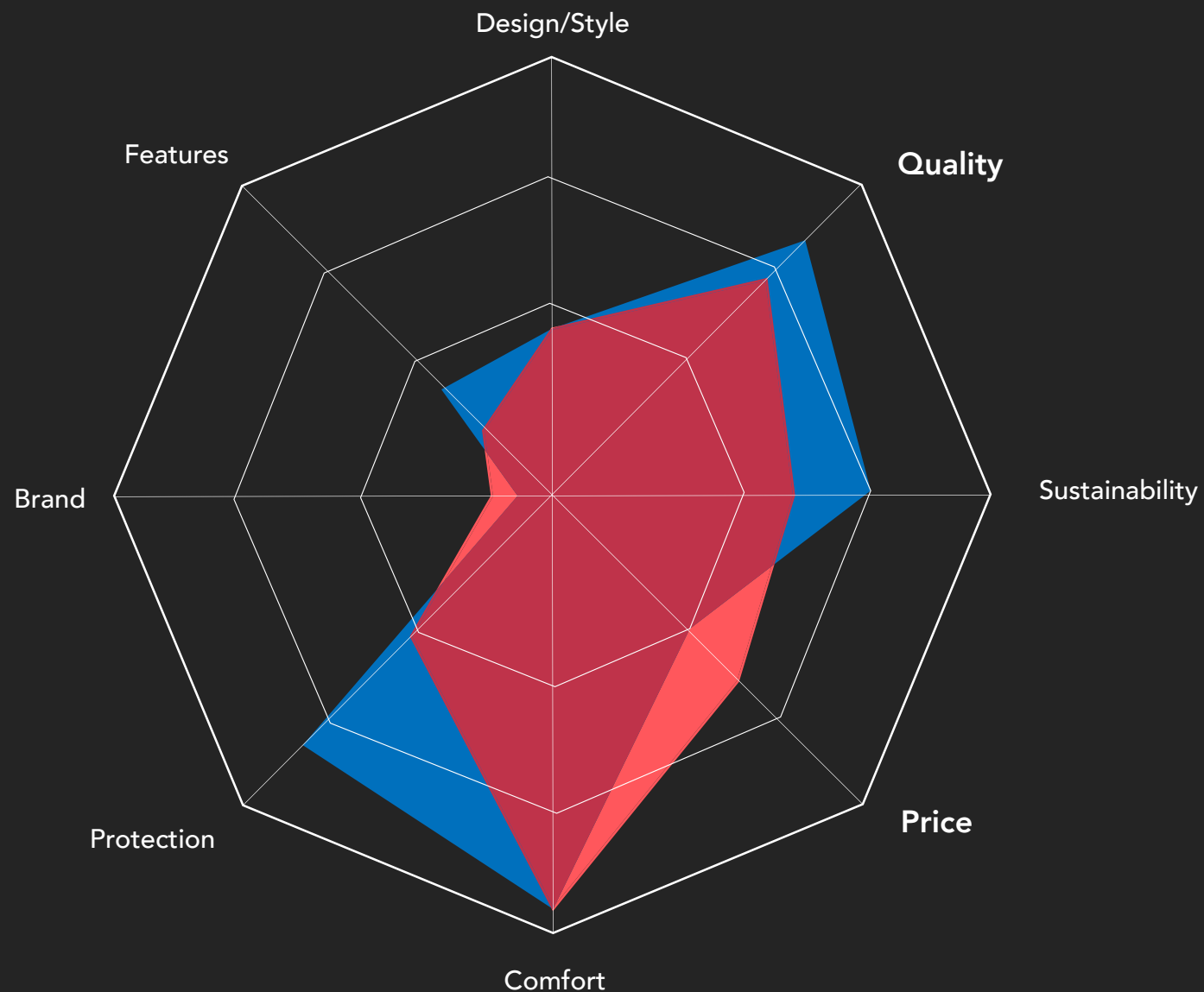
I also had to keep in mind the skateboarder – what would they actually want to carry around with them? In order to better understand this, I listed out the common items that skateboarders will typically carry with them and their respective locations, such as water, a skate tool, wax, headphones, and more.

If I was to design products that could help the skater customize their session and comfort, what would I be asking them to add to this list?



I then asked over 100 skaters to tell me the **three factors** of choosing a skate shoe that were most important to them. Ultimately, it came down to three main factors that they cared about the most – **quality, comfort, and price**. While many of them mentioned sustainability and protection as secondary factors, but not things they would actively look for, other factors like appearance, style, and the brand that they wanted to support took precedent when it came time to buy.

I then took it upon myself to decide which factors I would use to improve skate shoes while holding true to which factors that skaters cared about, even if they didn't choose them specifically. This is shown in blue. The areas of overlap are shown in dark red.



Takeaways from skaters:

Skateboarders are very knowledgeable about their preferences, and will shop around until they find what they like.

Socioeconomic issues like animal-cruelty and poor labor conditions have a strong influence on some skateboarder's decisions.

Protection is not seen as a commonly important factor in a skater's purchasing decisions.

Conclusions for my direction:

Protection is the element in skate shoes that needs improvement and attention.

Customization need to be offered to cater to the diverse preferences and changing tastes of skaters

Provide hidden protection to work around the stigma of wearing protective gear.

Skate footwear products need to address the waste created and the impact on the environment.



3 Medical and Health Research

What does performance mean for a healthy lifestyle and skateboarding?

Sports Therapy

Performance in sports therapy means being able to:



Notice when your body is warning you of injury
Skate at your highest level without tiring early
Having control and balance
Properly warming up and cooling down

Skateboarding Mentality

Performance in skating means being able to:



Feel your board when you flick and push
Not be in pain at the end of the day
Shoes last long enough to make them worth it
Being able to skate past the age of 35

**Have you ever invested in braces or other supportive gear?*

"Nope. If I die then I don't have to pay rent."



Skateboarders need to find the balance between skateboarding the way that they want to and taking care of their bodies. My initial thought was to see how I could integrate this into my design to effectively help this in this process more smoothly, which led me to my further research.

Skateboarding and the Body

Over years of skating, even small injuries can build up to larger issues, or can lead to a significant reduction in muscle strength, while potentially also causing other bone and muscle issues.

The average pro skateboarder's career is **3-8 years**, and many are cut short or end because of serious injury rather than being replaced by new riders. While these injuries can span from concussions, to broken back bones or arm injuries, most of them involve the feet or legs, such as ACL, ankle, or knee injuries.

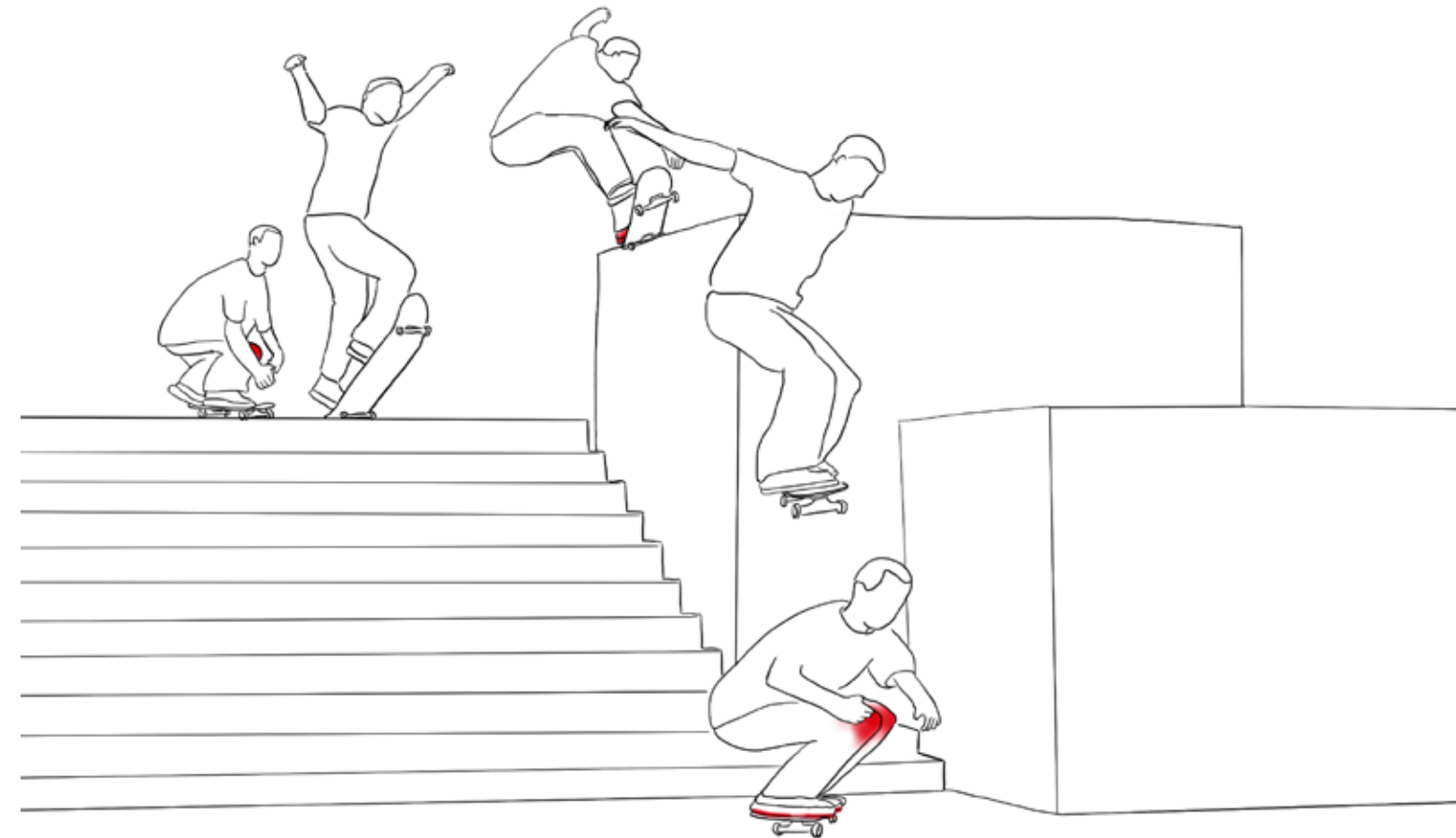


The foot has 26 bones, 33 joints and hundreds of muscles and ligaments, which means a lot of opportunities to become injured.

Injury or severe foot pain can be devastating to one's quality of life, and some breaks and infections can lead to **long-term damage or disability** if it not treated. Sprains are stretched or torn ligaments that can result from pivoting or having a foot caught while trying to move in another direction, and are the most common type of injury when skateboarding. Other typical skate-related foot injuries are heel bruises, hot pockets (hot pain in the front of the instep), or blisters which result from shoes not fitting properly and rubbing against the skin of the foot.

Dynamic training leads to an increase in isometric force, which has a direct correlation to peak jump height.

The height of the ollie is result of upward acceleration that occurs at the start of the jump, meaning that increasing the ability to accelerate results in a higher ollie, along with being able to move the front leg accordingly.



Performance of the ollie maneuver depends on muscle power and timing. This can mean that excessive muscle strain and force, especially combined with impact to similar muscles, can reduce the ability of the skater over time.

Performance Analysis – Professional Insight

I started creating my network by contacting some of the resources on campus that are experts not only in general healthcare, but have an extensive knowledge in Occupational Therapy, and have experience diagnosing foot injuries and solutions.



Monique Chabot – OTD, MS, OTR
Occupational Therapy Professor
Jefferson University

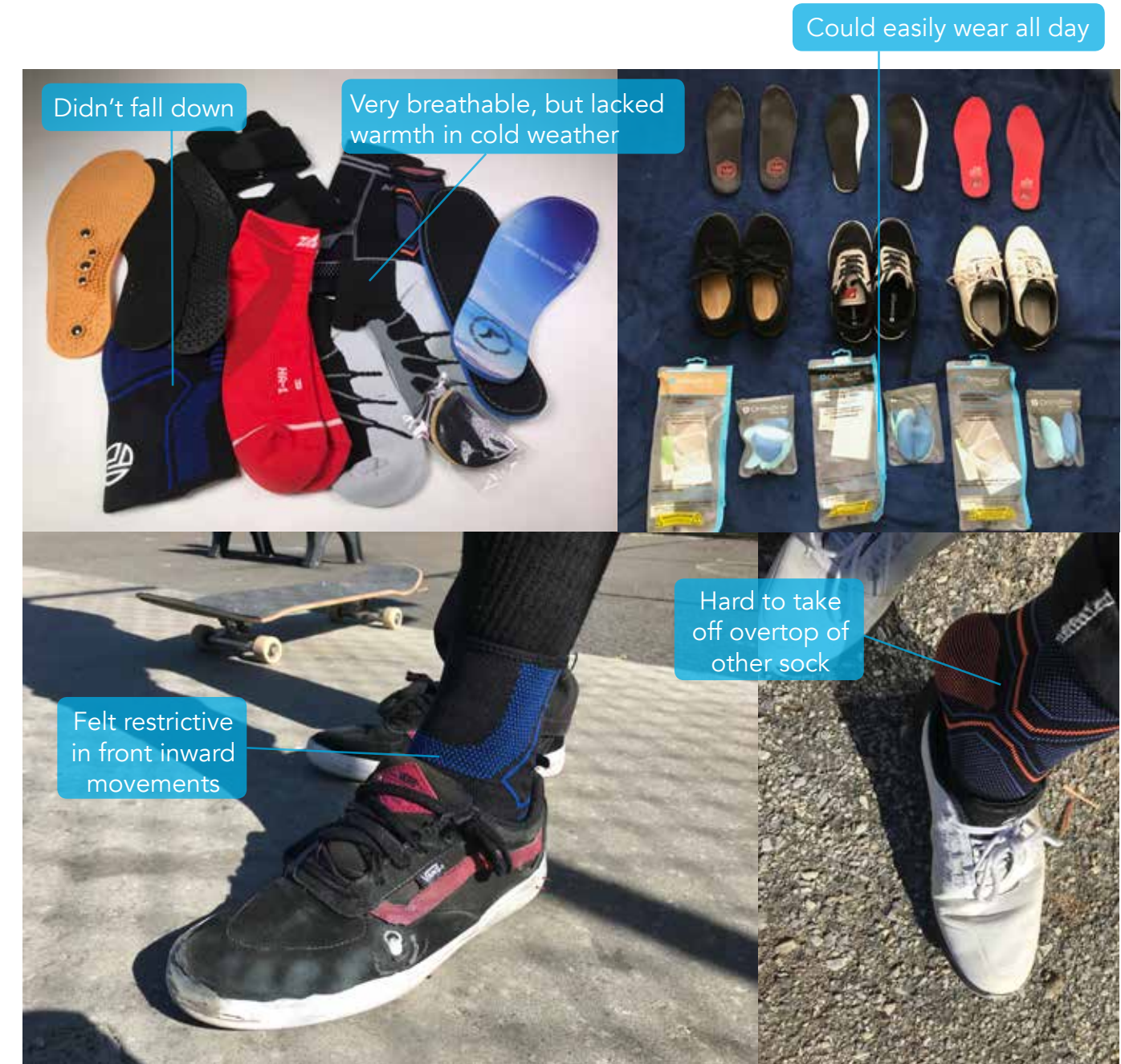


Mikael Avery – MSOT MArch, BSLA
Adjunct Industrial Design Professor
Jefferson University

After meeting with Monique, we established that it would be best to tackle the two main typical injuries that skateboarders face. She also gave me the insight to experiment with kinesio-taping, a method of assisting in muscle movements which might be beneficial for my later designs.

I then met with Mikael Avery, a professor in the Industrial Design program and a practicing occupation therapist to discuss braces and supports that are typically recommended for performance activities. We concluded that offering support for developing injuries or after injuries was best rather than before injuries, as reliance on braces could cause additional problems. This would come to influence my design direction and how I addressed injuries.

Testing Market Products



While I was meeting with them, I was doing my own performance testing – figuring out what the products both recommended/designed for skateboarding and for general sports performed like, and so that I could present these to skaters and have them skate in them to give me feedback.

These insights carried into my design considerations moving forward.

Kinesio-taping

Kinesio tape and the Kinesio® Taping Method is a therapeutic taping technique that is intended to offer support to muscles around the body, as well as assisting in rehabilitation for injuries and conditions. The tape causes no compression on the skin, and can be intended to be worn for up to 3-5 days. The premise is that the patient's lymph and blood circulation become more focused in those areas, which can help in rehab and in relieving pain.

Using the tape, I experimented with different patterns and tensions to see if there was any potential benefit from using it.



"It was designed to run with the contours of the skin... It allows free movement of lymphatic fluid, reducing friction between the tissues and the skin."

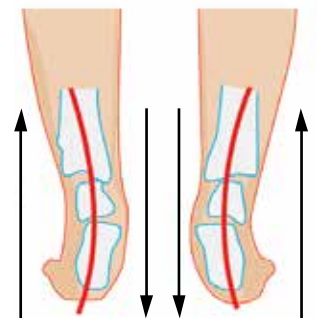
- Gavin Daghli, Mike Varney Physiotherapy, Essex U.K. Source: Sports Medicine



Over pronation in the feet can be an effect of one's natural gait, or a result of incorrectly-developed muscle memory for an activity, or as the body's instinctive response to work around pain from another injury.

In practice, kinesio-tape allows the user to relieve and influence this by creating directional tension, which can assist in correcting any issues.

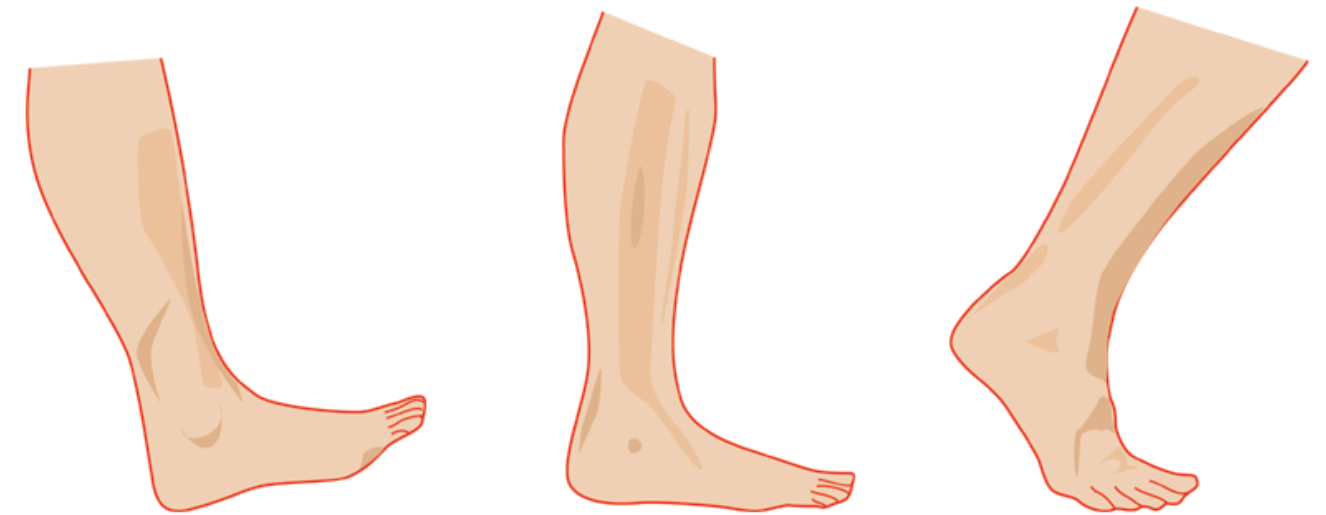
Based on my conclusions, I found that the amount of pressure given from these specific patterns provided a comfortable support while not preventing the typical muscle movements when skating. These patterns of resisting and assisting in muscle movements directly informed my placement of materials within the products I began designing, for areas of stretch, padding, flexibility, structure, and compression.



Performance Analysis – Gait Analysis

In order to get a better understanding of the impacts of gait on the foot while skating, I documented the pushing process from multiple views to see if any inherent pronation or supination occurred. With skateboarding footwear having such a strong inspiration in the past from basketball footwear and the protective considerations of those shoes, I wanted to see

Based on what I saw, there was not a significant amount of evidence that the skater would push with any angular distortion, however I was able to get a better understanding of where in the foot the most stress during the pushing process comes from, as well as at which points any pronation or inversion might be occurring when injured.



Contact phase

Midstance phase

Propulsion

What I realized was that skateboarding had a similar push as other sports when looking at the foot from the side. What can be different though, is the way that skateboarders push next to their board. Because your forward foot is offset from the ground by the board's height, your pushing foot's gait is now forced to be lowered than if running. While this typically does not directly create any issues, it was something I took into account with the way that forces while skating around may influence pressures and support on the feet.



The height of the board is offset from the ground, creating an offset in a skater's typical gait.

Interview with *The Daily Push*

Skateboarders typically don't refer to themselves as athletes, and because of this, the development of medical and health professionals specific to their sport and needs does not yet exist.

However, that has been recently changing. A small group of physiotherapists that specialize and emphasize health and recovery tips for skateboarding have started to gain traction, through not only social media platforms like Instagram and Facebook, but through their local communities and professional skateboarder clients as well.

I talked to a few of these physiotherapists to get their pointed, direct insight and expertise of how to develop supportive and protective gear for a skateboarder's feet, and to get their insight on my concepts later on. These are some of the main takeaways I gained.

Jeroen Stam – Skateboarding Physiotherapist – Netherlands
@Skateboardingphysio

M: What are some of the things that you recommend to skaters for warming up, as well as cooling down after a session?

J: I recommend the RAMP principle for warming up – Raise your heart rate, blood pressure, and blood flow, Activate and Mobilize muscles and joints concerning the activity, and Potential – preparing your muscles to do their absolute best. In general, I suggest dynamic stretching for warming up, and to leave static stretching – like holding stretches and foam rolling – for cooling down and recovery.

M: Do you feel that skaters can be made more informed and incentivized to be more considerate and take better care of their bodies through a product?

J: Do you feel that skaters can be made more informed and incentivized to be more considerate and take better care of their bodies through a product?

I do really believe in education, teaching skaters how to treat their bodies in a good and reasonable way. So I think if something could assist the skateboarder in that way, it would be great. But besides foam rollers and that kind of stuff I don't use anything to make it easier or quicker. The warming up has a goal and to me it feels like cheating if you take the easy way out. My experience is that everything that makes something easier or quicker has a negative effect somewhere down the line. You want to let your body know what you're doing before you skate the s#t out of it.

M: Do you feel that influencing the tension and compression on specific muscles would be helpful or harmful to a skater?

J: You can play with it by altering the position of your joint. For example, less dorsiflexion means less forward motion of the knee when you land. This means less stress in the knee. But energy has to go somewhere so it goes to your hips. So you need more hip flexion, which then means more stress on the hips and the surrounding muscles.

“Let your body know what you're doing before you scare the s#t out of it.”

M: What are some typical problems that skaters have with ankle braces when it comes to treatment of their injuries?

J: The restriction in motion. But that's the whole idea of a brace, to limit motion so you feel less pain. Also, pressure points under the foot where the brace stops. They can hurt really bad after a day of skating.

M: What percentage of injuries and recovery do you feel could be influenced or prevented by a product like a brace or insole?

J: Ankle injury would be more like 90% regimen based, but heel bruises or front foot bruises would be like 50% equipment based. But generally speaking I would say that 80% is regimen and 20% is gear based.

I only recommend braces when returning to skating. They're not that good in preventing ankle injury, but they are good in helping you do kickflips without pain after an ankle injury. It's important to know that for preventing injuries like an ankle injury, the brace or shoe or whatever tool you use, has to withstand bodyweight and added forces created by gravity and momentum. This adds up to multiple times your bodyweight. So a shoe or brace has to become real sturdy or bulky and right now there is not a shoe that prevents injury without being sturdy, rigid or bulky. So if that middle ground can be found that would be awesome, but until then training your body is the best way. At least in my eyes.

The material used plays a large role in the comfort and performance.

Focus on supporting the skater when they are skating and afterwards through the benefits of the material.

Provide supportive tension but allow for the needed range of motion.



Matt Beare – The Daily Push – UK
@the.daily.push

M: What are your thoughts on ankle braces, and the problems that skateboarders typically have with them?

M: Considering the amount of mobility required in the ankle, it might be difficult to offer support whilst maintaining the necessary freedom of movement in the ankle, and not feeling too restrictive. However, maybe it would be beneficial if the brace allowed freedom of movement within the normal range of motion of a skater's ankle (eg, between neutral and the point of maximal inversion when doing a kickflip), but then stiffens up at the end point of normal range of motion.

M: Based on the insoles out there in the market, such as Footprint or Etcetera, what do you think could be improved?

M: I would also focus on having some protection under the ball of the foot on the insole, like Footprint do. I remember reading a paper where they had skaters do different tricks on and off of a force plate, and they showed most of the force would go through the ball of the foot.

The question of how to convince skaters to adopt healthier practices is one that I've struggled with a lot during the creation of my site. I still can't tell you exactly what works but my theory is pretty much that we have to sell it to them, like any product. Explain to them why they want it, e.g. to improve how they skate. Also all skaters want to skate as long as possible and the idea that one day they won't be able to can be scary so showing that considering a healthier lifestyle will help them skate for longer can be a good route as well.



M: As someone promoting the wellness and fitness of skaters, what is your approach to trying to help inform skaters on your content?

M: In general skaters can be pretty insecure around these kinds of things and it definitely isn't considered "cool", yet. For this problem I've tried to keep the presentation of the info light hearted and as doable even by the most insecure skater. For example in the warm up the cardio option is just skating, and the dynamic stretches don't necessarily call much attention. It seems a little stupid but that's how it is.

M: Are there any products out there right now that you see as helpful in making skaters want to warm up or cool down more?

M: I've thought about recommending equipment in the past, and I mean it could be helpful for a normal athlete, but I think tools to bring on the session aren't that necessary and could just make some skaters feel uncomfortable.

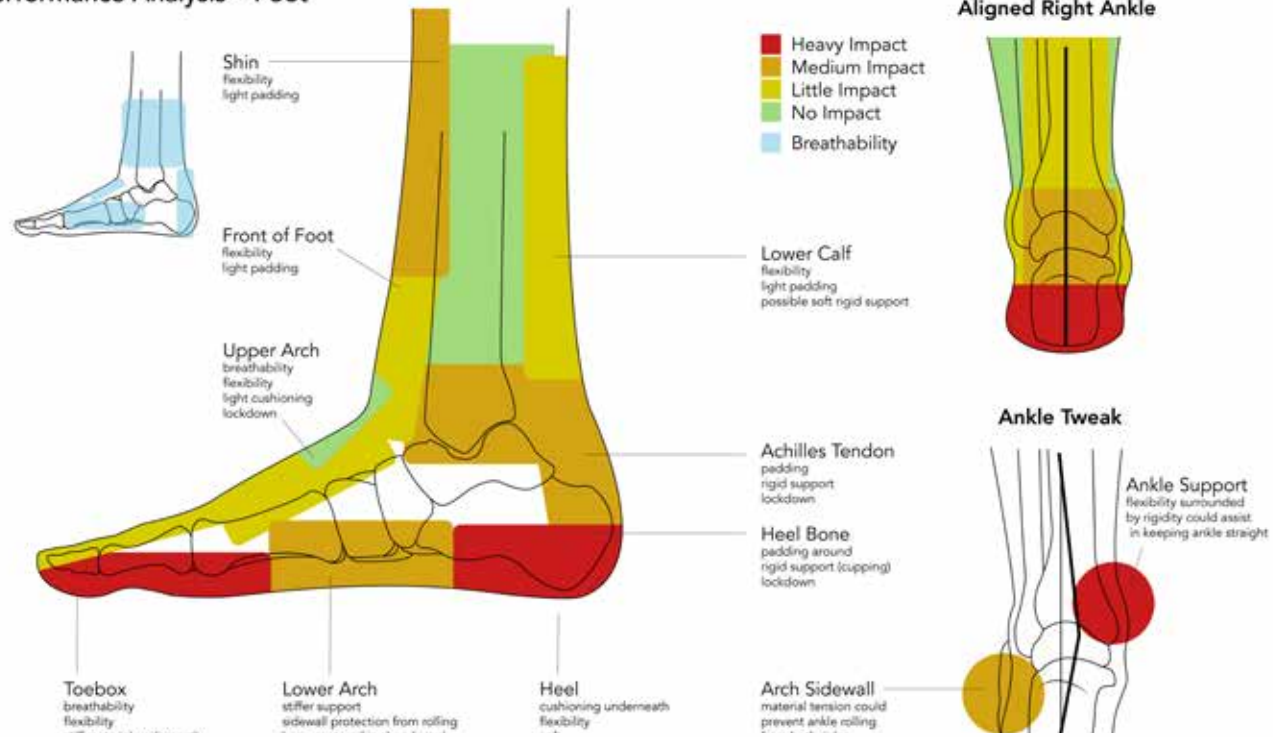
M: What other thoughts do you have for me to consider?

M: Make sure not to forget about breathability - current braces get super sweaty quickly and really uncomfortable. The sweatier the braces get, the more they start slipping out of place.

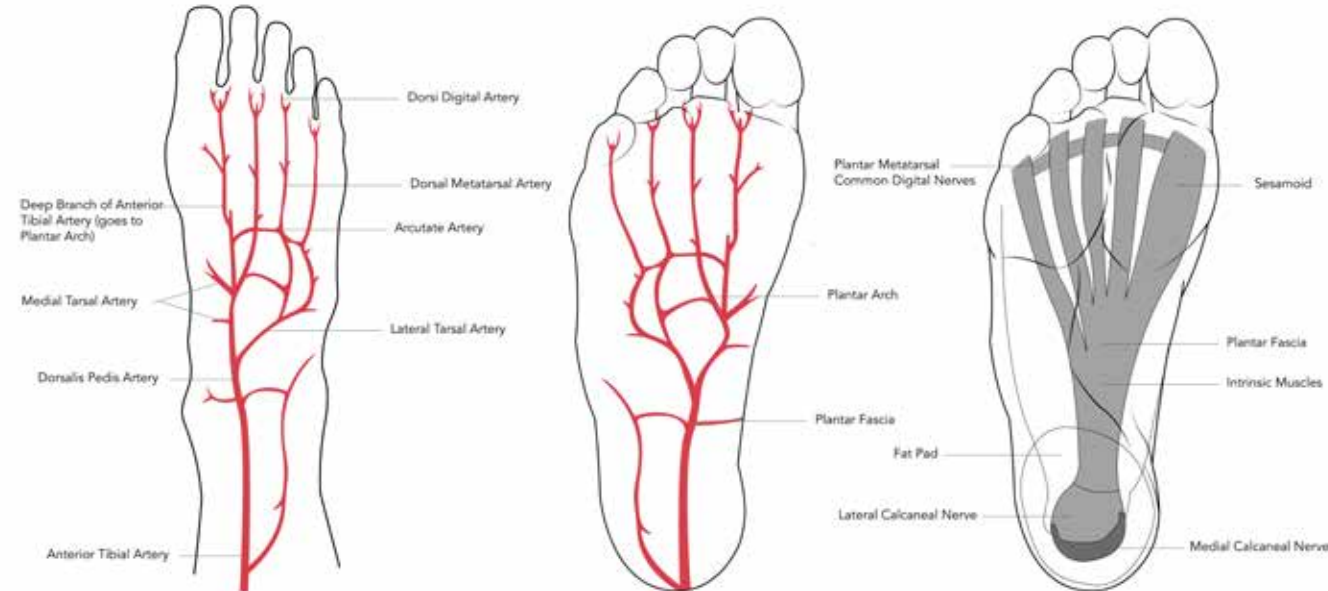
Performance Analysis – Sock

I started by creating my performance analysis, which started with the core element – the foot. I needed to get a better sense of how the anatomy of the foot can be affected by footwear and injuries.

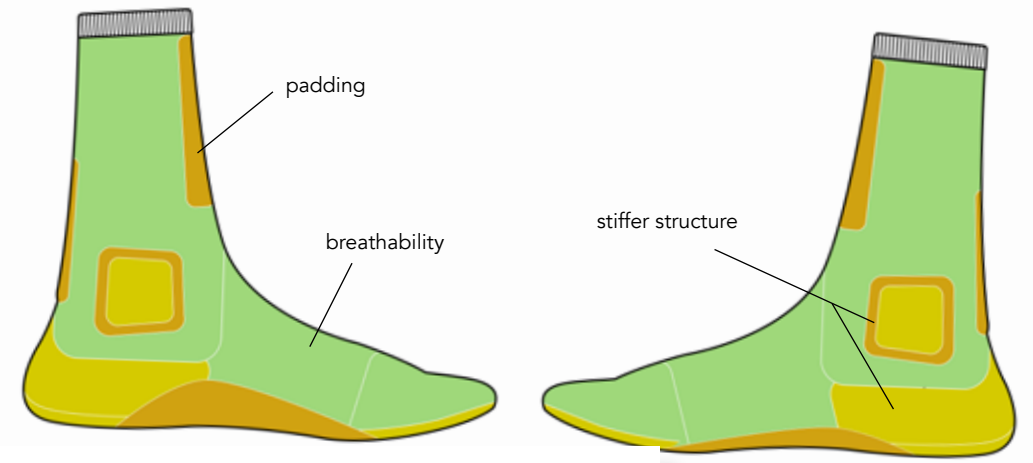
Performance Analysis – Foot



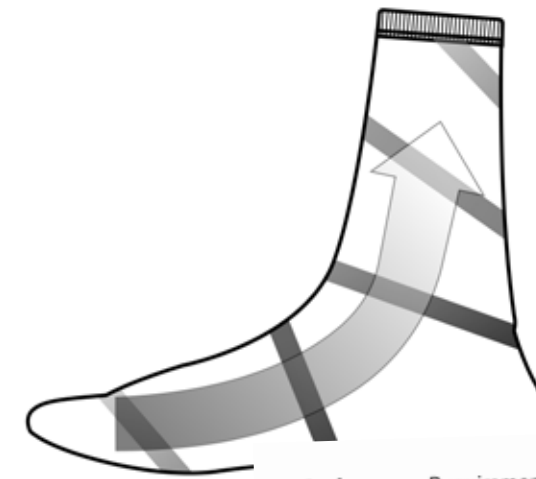
I then analyzed the bloodflow within the foot, and where the path of the main muscles fell. This would be important to keep in mind for addressing better performance and material placement.



Performance Requirements – Basic Sock

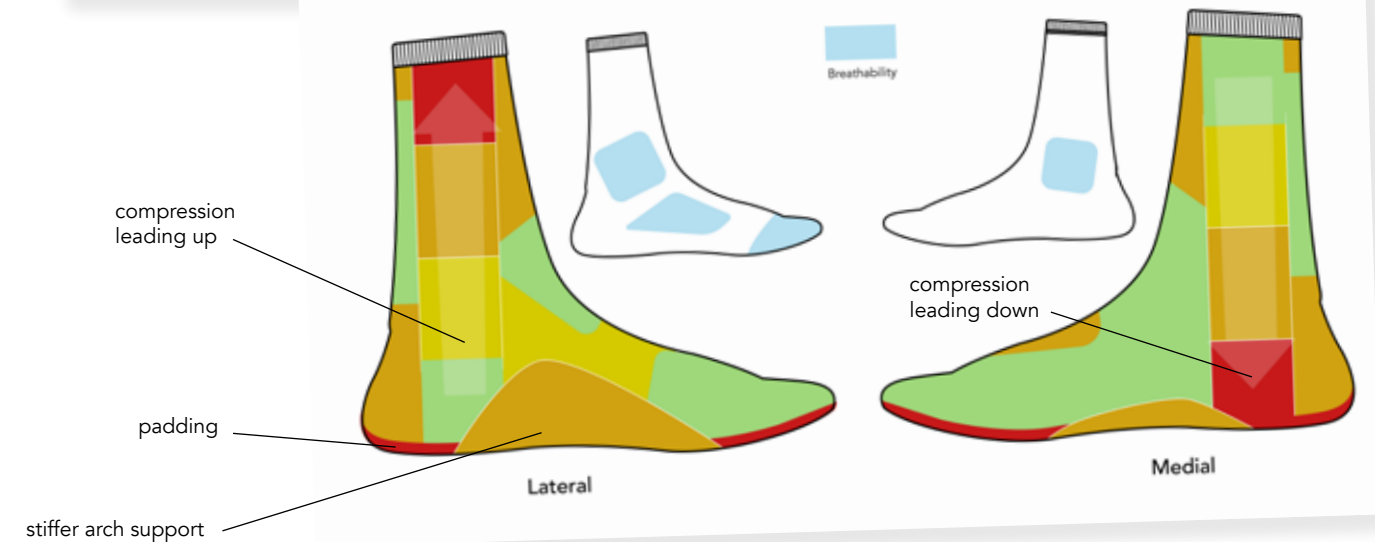


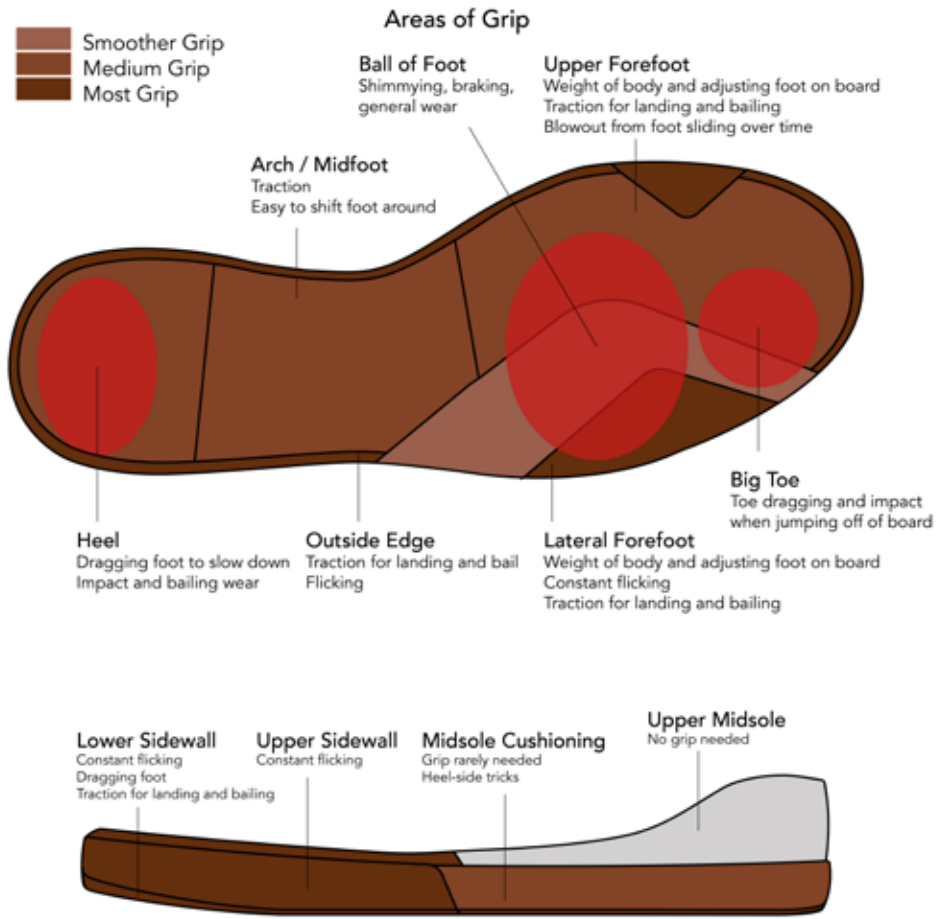
Performance Requirements – Sock



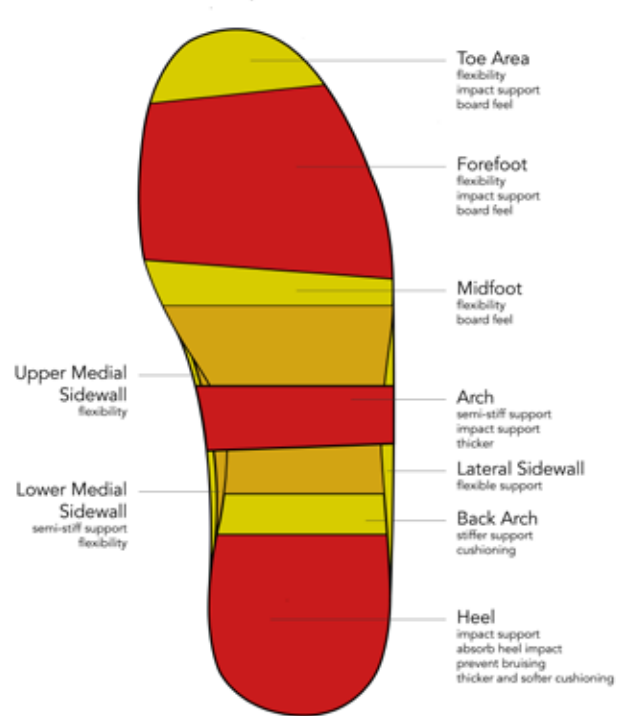
Based on what I learned, I developed patterns for the basic needs of a sock for skateboarding, as well as for a higher performance product, utilizing compression.

Performance Requirements – High Perf. Sock





Performance Requirements – Insole



- Heavy Impact
- Medium Impact
- Little Impact
- No Impact

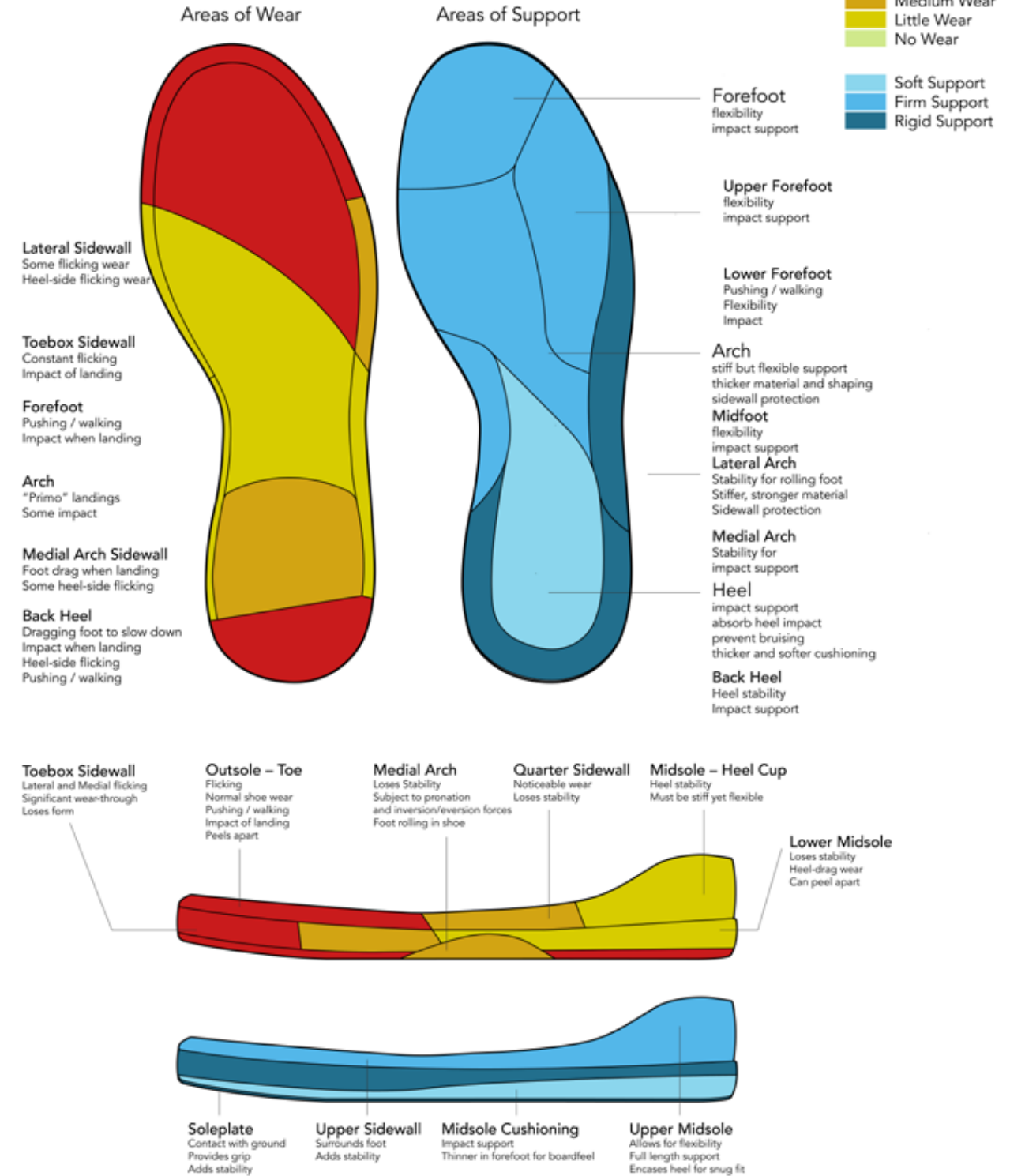
Aligned Ankle



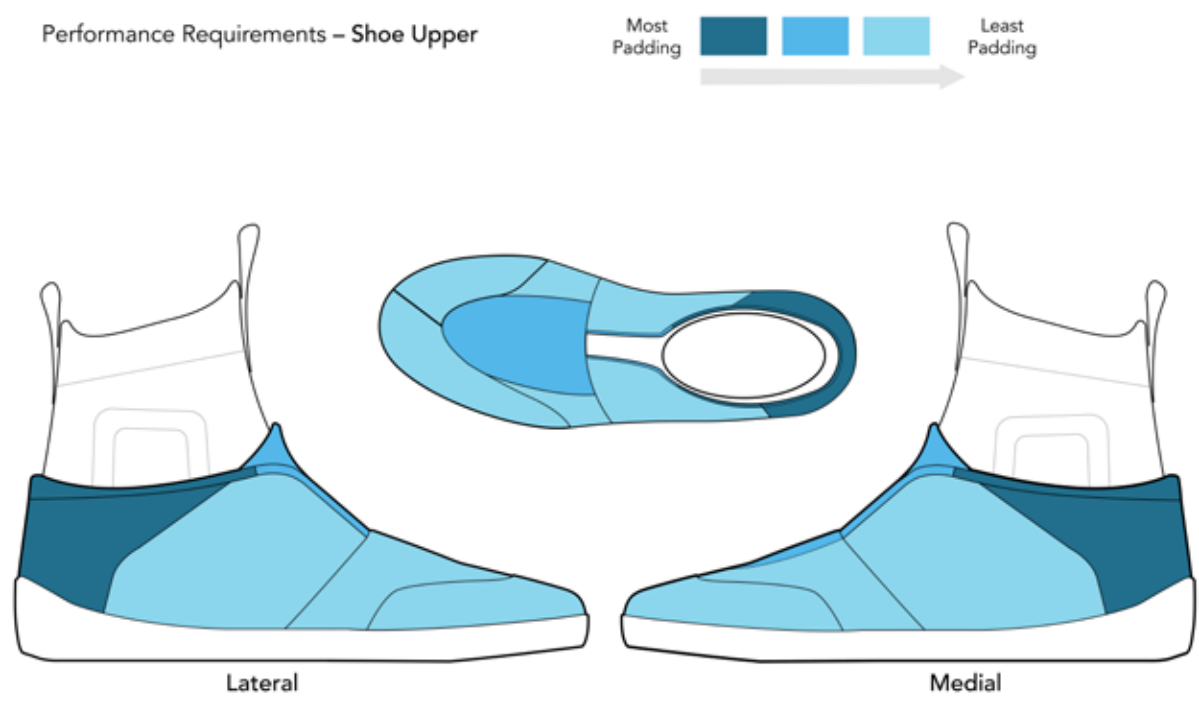
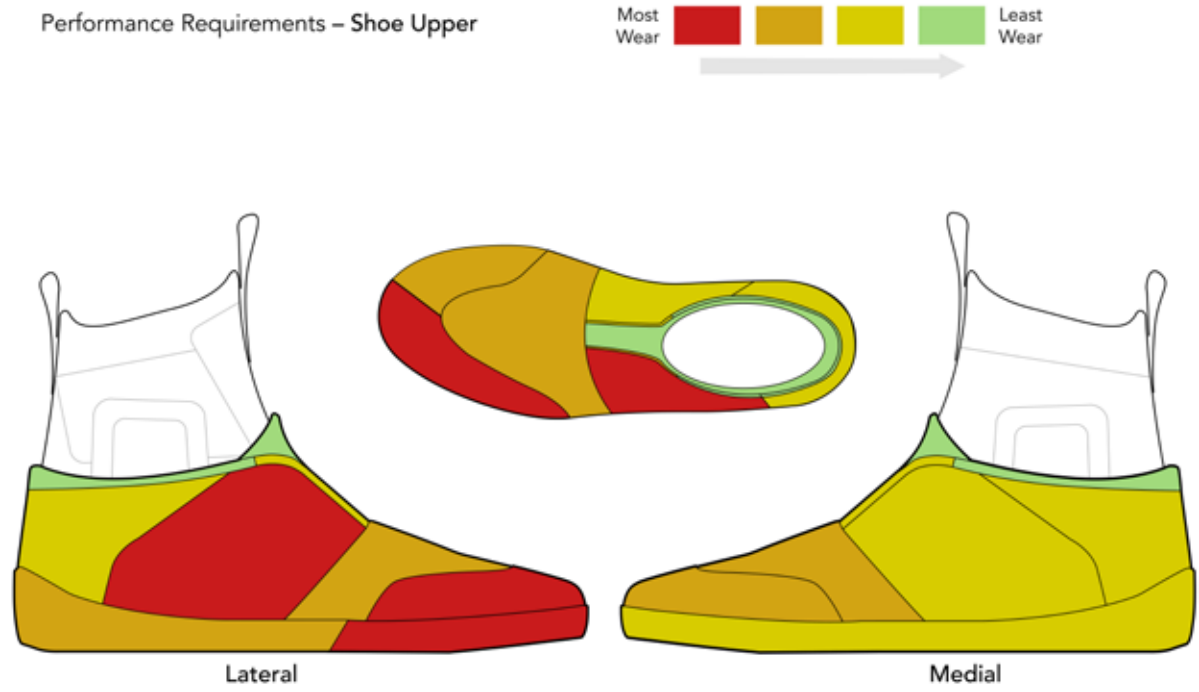
Orthopedic Insole



As a skateboarder and backed up by my research, I developed benchmarks for the different needs of the insole and outsole of the shoe in different areas, and how those areas performed in terms of factors like support and wear.



I extended those considerations into the upper of the shoe, so that when it came time to design, I would have a foundation of performance knowledge to guide me through the material placement and construction.



Takeaways from health professionals:

Kinesio-taping can be used to test the effect of manipulating muscles in the ankle and foot with tension, and inspire performance patterns.

Trying to cheat or make it easier to warm-up/cool-down can do more harm than good.

Skaters will be more accepting to the benefits when presented not as health benefits, but skating benefits.

Conclusions for my direction:

Support around the foot has to match the injury and skating scenario, and not interfere with comfortable muscle motions.

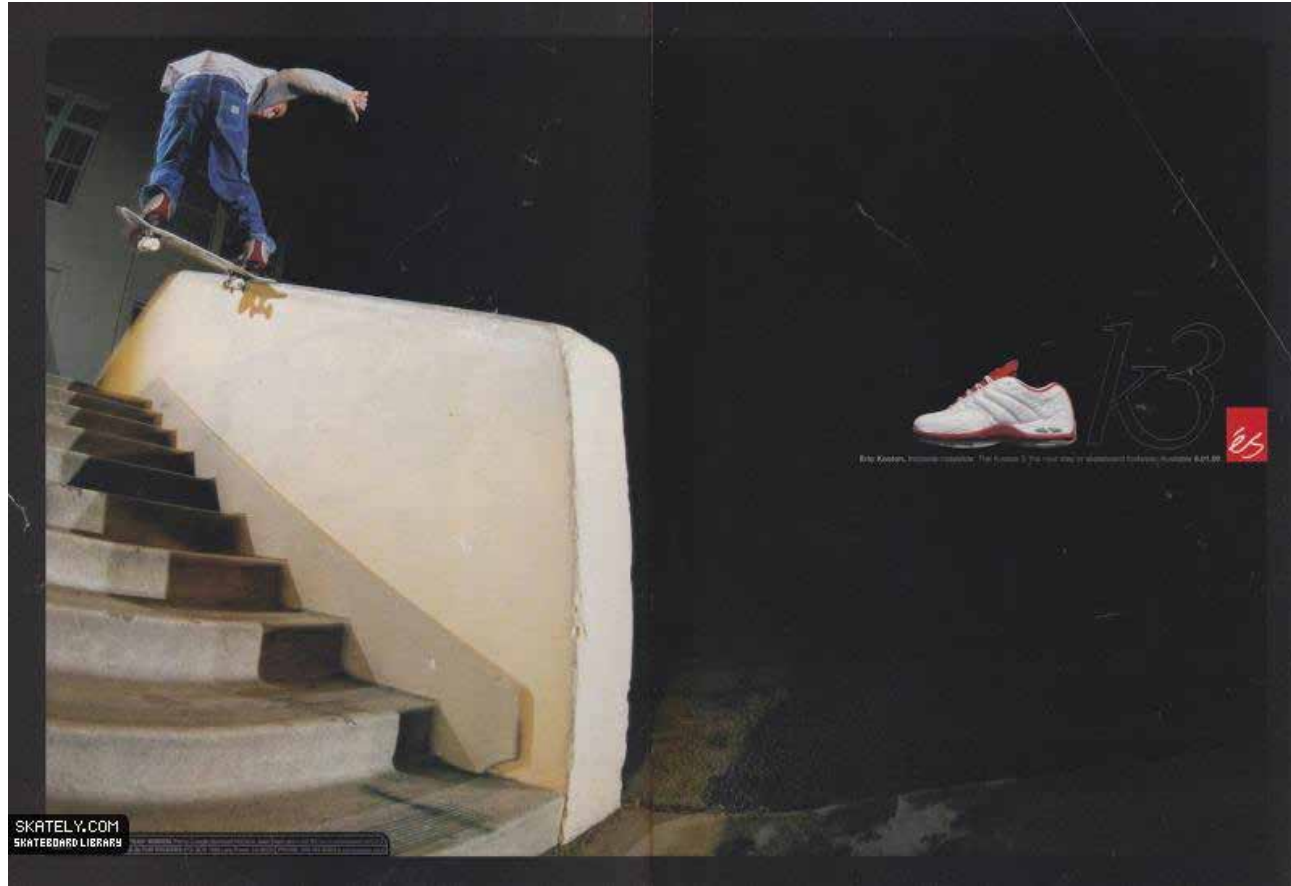
Focus on supporting the skater when they are skating and afterwards through the benefits of the material.

Proper exercise needs to be advocated for, but not integrated into the design.

3

Market Research





Skateboarding footwear really took off as being differentiated from other sports footwear in the 1980's and 90's – iconic shoes like the eS Koston line brought in a wave of basketball-inspired skateshoes to the industry, and many even preferred to skate in Nike's Jordan 1. These bulkier, tank-like shoes provided not only significant cushioning, but used a lot of layered suedes and leathers to create the most durable shoes possible. Only available at skate shops or by mail order, many of these shoes would wear down or break apart in the construction far before you'd wear through the material, but it came at the added cost of bulk, loss of boardfeel, and use of lots of material.



eS Scheme



eS Koston 3



Nike Jordan 1



Due to changes in fashion, the demand for more board feel and slimmer looks, many modern skate shoe brands have cut out the rugged materiality and protective designs for simpler, more clean-cut silhouettes. Many of these tout significantly better board feel, but with that comes less protection from the impact of the ground, fueling the cycle of foot injuries. While there are brands that still carry some of their more padded models as legacy products, there is no superior option or construction that has outlasted the shifts in style and fashion.



Vans Authentic



Nike SB Janoski



New Balance Numeric 345



By 2020, skateboarding footwear will be a \$1.6 billion industry. Here's what's selling.

I did a thorough market analysis of the skate shoe portfolios that many of the current top brands sell, and I took away a few main things.

rising price range.

\$\$\$

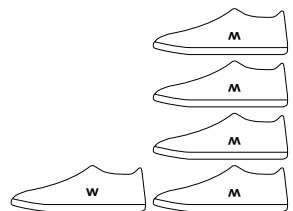
With the addition of more technical materials and more performance-based technologies built into the shoes and insoles, the market has seen a climb in the higher-end skate shoe price point. Many larger brands like Nike, Adidas, and New Balance bring in their fashion product "drop" style into skate footwear, often releasing special run shoes or offering the ultimate tech shoe in addition to more traditional silhouettes.

authentically technical.

In order to compete and to stand out from the growing crowd of skate shoe brands, products with more technical features, materials, and technologies are being pushed to the consumer. In order to appeal to skaters, brands continue to mesh these new features into the classic styling of their product lines to innovate.

very few women's shoes.

While many brands are finally adding female riders and giving them their own colorways of classic shoes, very few if any are actually providing them with their own pro models. In fact, many brands still don't even have a women's skate shoe section of their website or product line. And of those that do, they mostly offer women's colorways of the Men's teams' pro shoes.



eS Skateboarding
 More only \$24.99 - \$109.99
 Large focus on iconic origins
 Doing collaborations
 Mostly suede and gum, only one vulcanized
 Refreshed color palette
 Mostly upper low/line lacing, some mid.

Nike Skateboarding (MENS)
 \$54.97 - \$150
 \$75 - \$85 most common price
 Mostly Nike, very few Converse
 Elite line and more specialty models
 Strong mix of mid and capsule constructions
 Basic and tighter and tech offerings
 More innovation like sockliners, Flyknit collars, Flywire cables

Emerica
 More only \$64.99 - \$79.99
 Mostly low, a few mid, and a few high
 Doing collaborations
 Mostly vulcanized but a few rubber cupsole
 Dark / earthy color palette
 Large number of Pro model shoes

New Balance Skateboarding
 \$40.00 - \$89.99
 \$99.99 - \$119.99
 \$129.99 - \$149.99
 \$159.99 - \$179.99
 \$189.99 - \$209.99
 \$219.99 - \$239.99
 \$249.99 - \$269.99
 \$279.99 - \$299.99
 \$309.99 - \$329.99
 \$339.99 - \$359.99
 \$369.99 - \$389.99
 \$399.99 - \$419.99
 \$429.99 - \$449.99
 \$459.99 - \$479.99
 \$489.99 - \$509.99

Adidas Skateboarding
 \$50.00 - \$100.00
 \$100.00 - \$150.00
 \$150.00 - \$200.00
 \$200.00 - \$250.00
 \$250.00 - \$300.00
 \$300.00 - \$350.00
 \$350.00 - \$400.00
 \$400.00 - \$450.00
 \$450.00 - \$500.00

DC Skateboarding (WOMENS)
 \$40.00 - \$80.00
 \$80.00 - \$120.00
 \$120.00 - \$160.00
 \$160.00 - \$200.00
 \$200.00 - \$240.00
 \$240.00 - \$280.00
 \$280.00 - \$320.00
 \$320.00 - \$360.00
 \$360.00 - \$400.00
 \$400.00 - \$440.00
 \$440.00 - \$480.00
 \$480.00 - \$520.00
 \$520.00 - \$560.00
 \$560.00 - \$600.00

Nike Skateboarding (WOMENS)
 \$40.00 - \$80.00
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 \$120.00 - \$160.00
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 \$200.00 - \$240.00
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 \$520.00 - \$560.00
 \$560.00 - \$600.00

On the Rise

Slimmer silhouettes and low-cut shoes are losing their appeal, and bulky tank-shoes of the past aren't coming back.

Many skaters are willing to pay a higher price point for better performance and longer lasting shoes. Many technology and material innovations of basketball and running footwear, such as air bags, lacing strategies, and more have trickled into skate shoes, but much of it isn't proven to actually help, especially as the shoe becomes more worn through.

eS – Sesla

Thermothane lightweight material, STI foam insole, thick full-length midsole.



Nike SB – Nyjah

Bootie inner construction, innovative durable exterior fabric, soft padding.



Nike SB – Koston Hyperfeel XT

Knit sock collar and durable rubber toecap.



FP Footwear – FINO Mark 1

Thick padding and "NASA-licensed" midsole technology.

None attempt to innovative the method of preventing injuries.

Innovations in running and casual footwear have potential in skateboarding footwear, in the same way that basketball shoes influenced skate shoes for so long as well.



**Under Armour Architech
Trainer Shoe – 2017**

Under Armour's new Architech line has promoted not only that they mean business in performance footwear, but that 3D printing does too. Using an algorithmically-generated lattice structure in the midsole, and a neoprene zippered ankle wrap, the Architech sits at a \$300 price point, but shows that innovations in cushioning using these production methods are coming, although significant development is still needed before they become largely commercial.

The design of footwear has changes significantly over time, but the art of fitting and making footwear is ancient, and is often presented as more of an artform than a health-focused product.

Small variations in shoes have been known to cause ankle pain, back pain, and even headaches. Depending on the shape of your foot and the forces that you subject it to, the requirements that the shoe has to provide can be very specific. Podiatry and biomechanics go hand in hand, and it is required to understand those factors in order to find the most versatile specifications to cover a broad spectrum of users with a high performance product.



**Nike Considered Line
Casual – 2005-2008**

What started as a goal to create product with a reduced environmental impact turned into a line that eventually brought those principles into the goal of all of Nike's products. The Considered shoes reduced solvent use by 80%, and used leather from tanneries that used recycled wastewater. The outsoles used Nike Grind material, a recycled composite of reject sole rubber. Hemp, veg-tan leather, and other natural materials were used in place of typical price-point alternatives. This line did not last very long, but it proved that the industry could do a lot to improve, and it's powerful "What if?" approach presents a shift in the footwear industry that is just now beginning to shift the industry.



**KI Ecobe – Red Dot Award Winner
Casual Shoe – 2016**

Frustrated with fast fashion and the use of toxic adhesives in manufacturing, an independent brand called KI Oriental in Korea developed this incredible simple, innovative footwear design, using only 6 parts, no glue, and a vast range of possible combinations. And it only takes 5 minutes to assemble with only a small amount of machinery, eliminating toxic factory environments and reducing waste. The KI Ecobe is a great example of the innovative power coming out of many independent brands and kickstarter campaigns, and the potential to fight the industry Goliath's with a simple idea.

While this product is a great modular design, functioning as a great indoor bootie shoe and a casual walking shoe, it unfortunately doesn't cater to performance. With expanded development into different areas of footwear, such as skateboarding, this concept could explode the entire industry and how we think about supporting our feet.



Typical shoe construction provides great performance, but does not allow for deconstruction or recycling.

Sustainability

There are very few shoes that reach even close to full sustainability, especially in the performance and sport divisions. Based on the materials most commonly used, manufacturing methods and locations, there is clearly a lot of room to grow. While some of what is ineffective about typical footwear construction comes from materials, transportation, inventory, dyeing, and processing are crucial factors as well.

Performance

Many of the more sustainable shoes lack any significant performance, limiting their market and usefulness.

In order to get a better understanding of the materials inside of skate shoes besides my initial shoe breakdown, I used an online resource called Weartested.com to not only understanding materiality but also how the performance was impacted by the construction.



Medial midsole cup



Thick insole cushioning



Knit collar

Directional grooves





By 2022, the global orthopedic braces and supports market will be a **\$4.93 billion** industry. Here's what's selling.

I did a thorough market analysis of the ankle and heel brace and support products that many of the current top brands sell, and I took away a few main things.



Most affordable braces are meant for any sport.

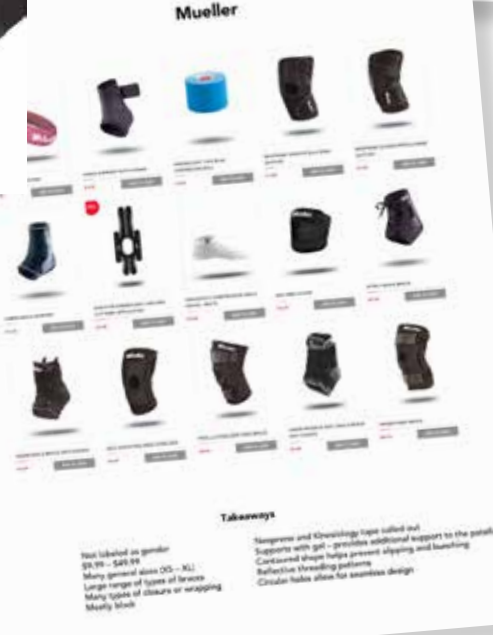
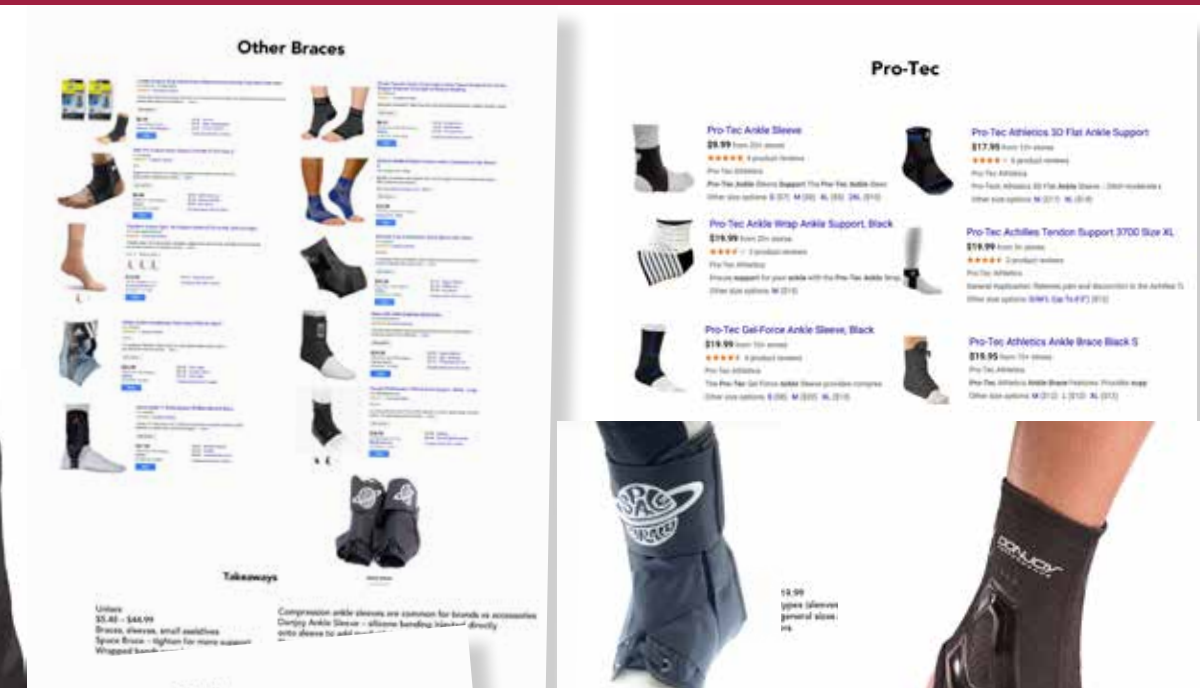
With the addition of more technical materials and more performance-based technologies built into the shoes and insoles, the market has seen a climb in the higher-end skate shoe price point. Many larger brands like Nike, Adidas, and New Balance bring in their fashion product "drop" style into skate footwear, often releasing special run shoes or offering the ultimate tech shoe in addition to more traditional silhouettes.

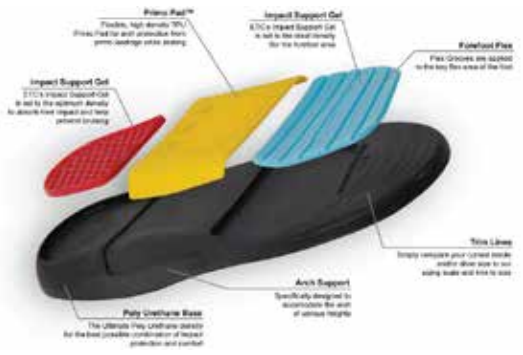
Support sleeves provide compression, and braces provide stiff support. Few provide both.

Typically there are two different areas of supportive gear for ankle injuries that are bought over the counter – braces, which often have laces or webbing and stiffer materials, or supports, which are often compressive knit sleeves that can be uncomfortable under the foot, not breathable, and hard to fit ovetop of socks or inside of some skate shoes.

All black everything.

Most braces keep it pretty simple and stick to black with accent colors highlighting the branding or straps. Because of this, it makes it very easy to identify that someone is wearing a brace or support. While this may not be an issue for other sports, this can be a large factor in skateboarding, as the stigma of wearing protective gear or letting supports influence your appearance can be a large factor in their use among injured skateboarders.





Takeaways
 Owned and operated by skateboarders
 Footwear brand new to the market
 Market heavily to the archless side of it
 Increase balance, stop the arch from collapsing (overpronation)
 Prevent arthritis from uneven cartilage wear
 Increase performance time

Other Insoles



Takeaways
 Some smart, most don't
 \$10.00 - \$199.98
 Acupressure patterns are typically cheap and not used in higher end insoles
 Smart technologies
 Cork for odor resistor
 Replaceable parts
 Many form options bc



Takeaways
 Not gender specific
 Separately labeled Men's and Women's
 \$14.99 - \$44.99
 Large price increase from supports to insoles
 Replaces current insole
 Different shaping based on gender
 Anti-Fungus "SilverGuard" top cover
 Brooms embedded with Titanium
 Latex Free
 One size fits all
 Adjustable strap design for provide

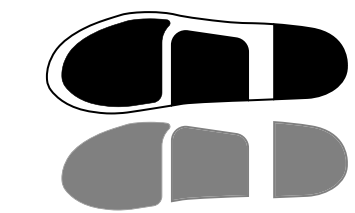


Takeaways
 Not labeled for gender
 All insoles labeled as Pro models
 Using color to indicate different materials
 Breathable mesh lining and arch support
 "Phyno Pad" - Flexible and firm TPU to help support from slope and over-rotation of foot
 Forefoot flex technology
 Owned and operated by skateboarders



By 2022, the global footwear insole market will be a \$1.7 billion industry. Here's what's selling.

Many insoles tout their placement of cushioning pods and stiffer materials as the advantages to their products. Many skate shoes even just use a giant chunk of foam, and get similar feedback from skateboarders. What's come into the market over the past 10 years is customizable insoles, like Z-Coil, OrthoSole, and versions made for hockey skates. These customized versions rise into the \$40-60 range, but this is expensive for the skateboarding consumer.



80 Customization



Affordability

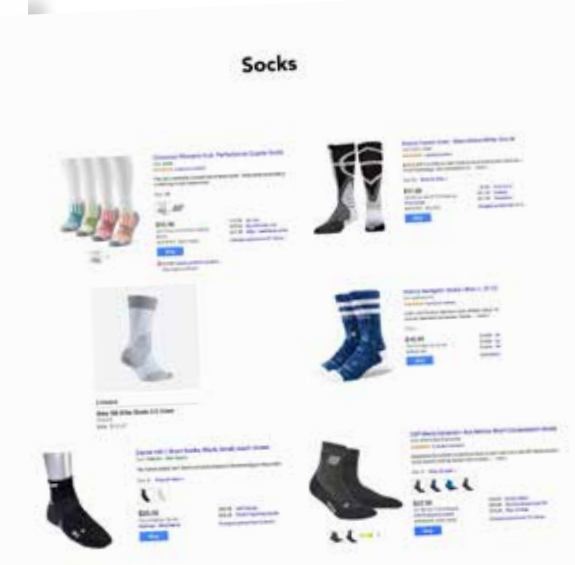


Thick base



“Performance Yarns Drive Innovation Explosion in Athletic Socks”

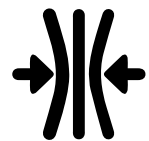
Consumers are searching more for advanced technology in their socks, especially because of the number of performance fibers available that are innovating qualities such as breathability, moisture-wicking, cushioning, coloration, and more. Stance socks, the largest extreme-sport (mostly skateboarding) focused company, has been debated as to their performance, but what they do offer is complex and attractive patterns that appeal heavily to skateboarders.



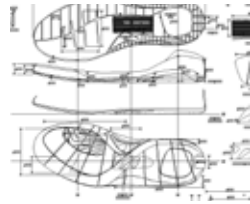
“Socks aren’t meant to take a beating like shoes, but if I gotta hole in my skate shoe then I usually get one in my sock.”



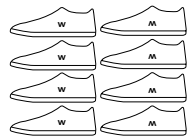
Many current solutions address general performance needs, but lack the engineered design specific to a skateboarder’s needs. SmartWool manufactures almost entirely in the U.S. and is the leading outdoor sock brand in the U.S., indicating that domestic manufacturing is very viable. Skate socks currently lack the complex design that other athletic sports have, and do not have many considerations specific to a skater’s needs, such as compression and ankle/shin padding.



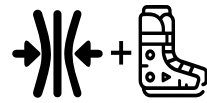
Once I had established my benchmarks, I was ready to move into the design process. I knew to keep my insights, research, and resources in mind as I developed the project further, and communicated often with my mentors and network to make sure I was addressing everything I needed to create successful products.



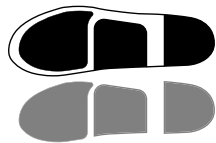
Authentically technical.



Design for women and men



Provide compression and proper, stiff support.



Customization



Balance quality and comfort with longer lasting materials



Affordability



Provide hidden protection to work around the stigma of wearing protective gear.



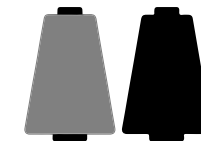
Stylish Patterns



Protect the ankles and shins



Made in the USA



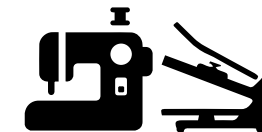
Supportive materials and fibers



Advocate for proper exercise



Address the impact on the environment



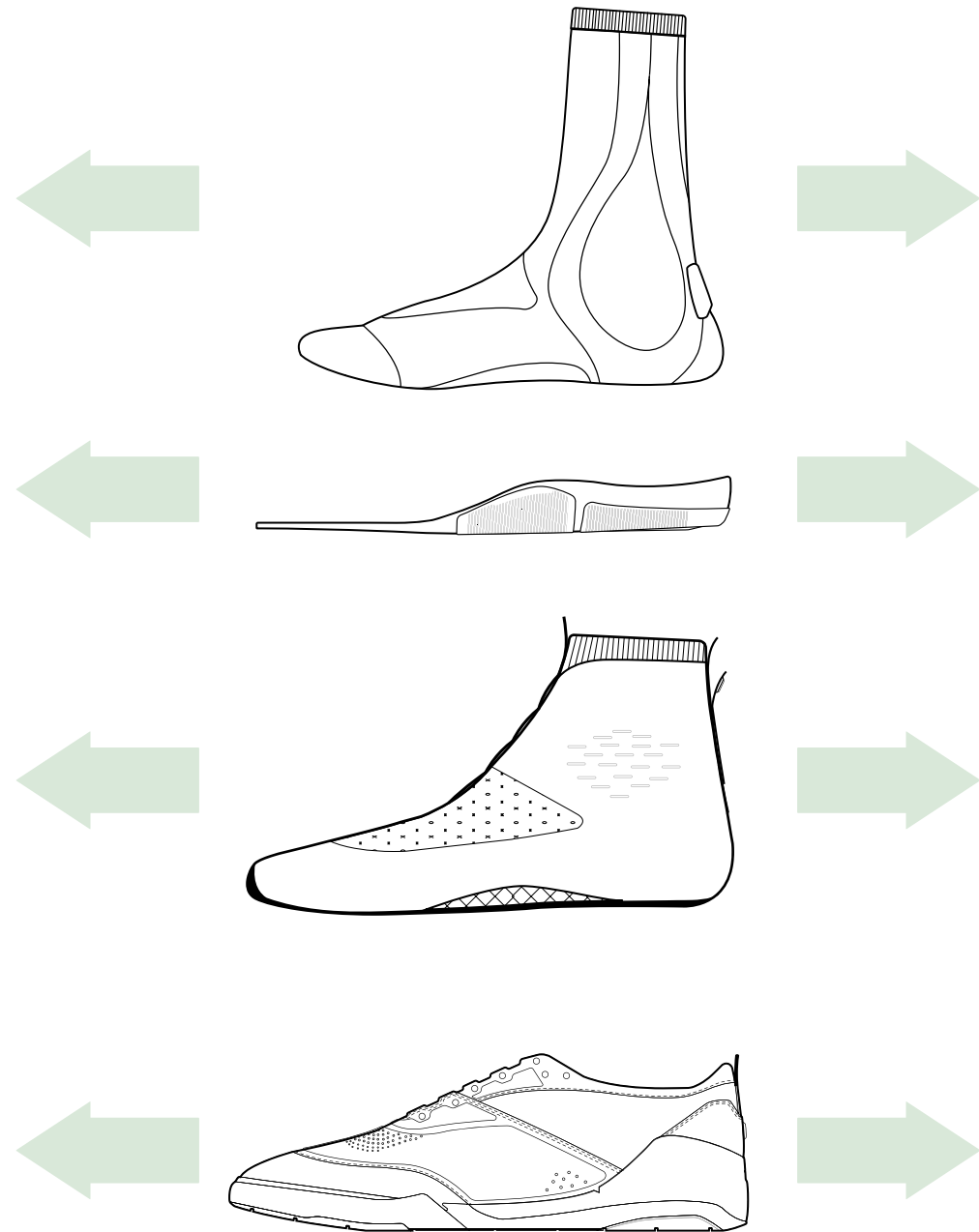
Innovative textile construction

From here I was ready to begin designing.



5 Design Development

there was a system where everything worked together?



Instead of buying these products separately...

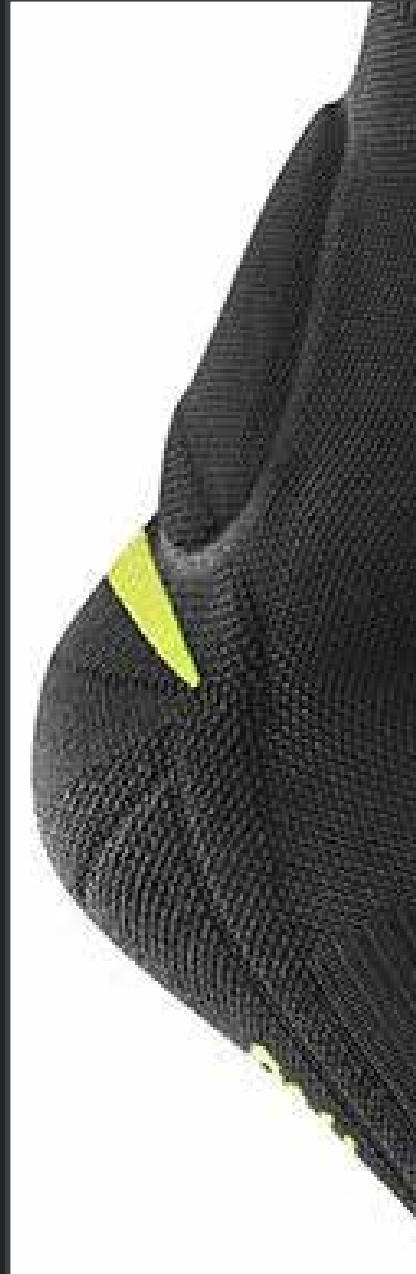
Each components of the system will be offered in different variations for different needs and levels of support. This allows for customization of your kit and being able to replace only what's necessary.

Sock
Provides compression, resists/assists in movements of muscles, and the support is hidden by graphic prints and patterns.

Insole
Sits inside of sockliner / brace. Has swappable support pieces which vary in density and thickness to customize for comfort and support. Kit would come with alternate pieces to swap out at any time.

Sockliner / Brace
Insole is placed inside of the sockliner, which can be swapped out for upgraded versions such as ankle or heel braces. It sits on top of the strobil board of the shoe. This way you could replace the shoe and keep the sockliner. Stiffer structures are integrated using knit technology to offer zoned support and protection. The brace look and aesthetic is hidden by graphic patterns and prints.

Shoe
Durable materials, hidden asymmetrical safety features, a full length midsole, and rubber outsole.



360° Hidden Protection

Protecting every part of the lower leg without it being obvious.



Customize

Providing customization in fit, protection, and style.



Longer-Lasting

Using high performance materials to elevate the lifecycle of the products.



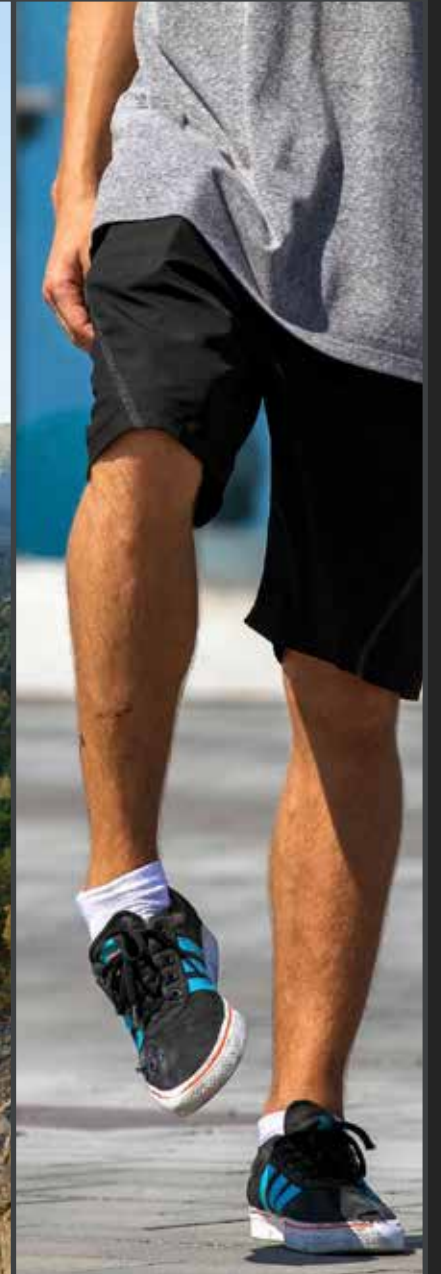
Inclusive

Creating products for all skaters, not just young men.



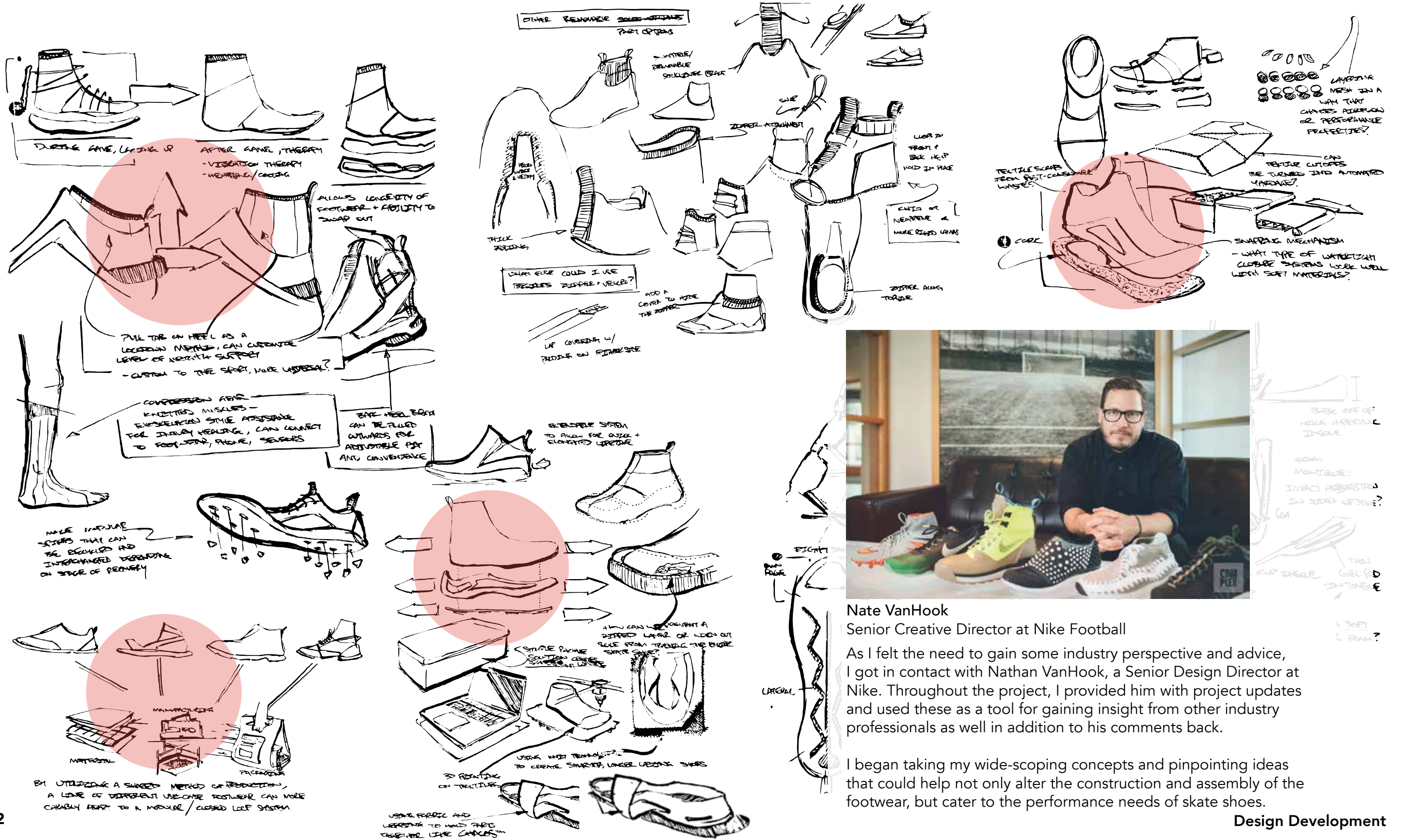
Eco-friendly

Address ways to create a smaller, cleaner impact on the environment.



Educate

Helping skaters understand when they are hurting themselves, and how to prevent it.



Nate VanHook
Senior Creative Director at Nike Football

As I felt the need to gain some industry perspective and advice, I got in contact with Nathan VanHook, a Senior Design Director at Nike. Throughout the project, I provided him with project updates and used these as a tool for gaining insight from other industry professionals as well in addition to his comments back.

I began taking my wide-scoping concepts and pinpointing ideas that could help not only alter the construction and assembly of the footwear, but cater to the performance needs of skate shoes.

Initial Concepts

Before I could further develop my initial concepts, I needed to talk to health professionals, who would help me better understand how and where I could influence the skater's feet, and in which ways were best for the types of injuries I was trying to prevent. They helped me establish criteria and pinpoint areas, which I then used to develop the performance analysis for the considered components, some of which is shown down below (see pages 58-62 for larger images).



Monique Chabot, OTD, MS, OTR/L
Assistant Professor
Occupational Therapy
Jefferson University



Mikael Avery, MSOT, MArch, BSLA
Adjunct Professor
Industrial Design
Jefferson University



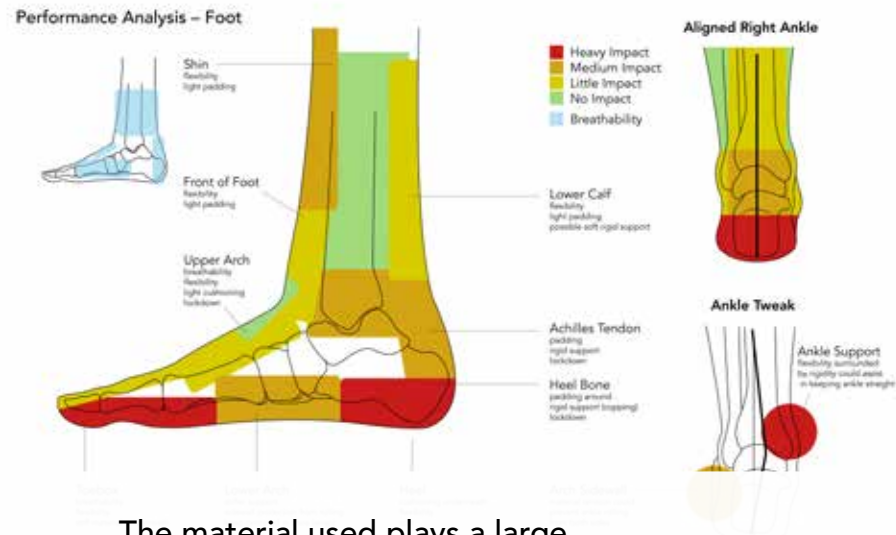
Jeroen Stam
Skateboarding Physiotherapist
@Skateboardingphysio



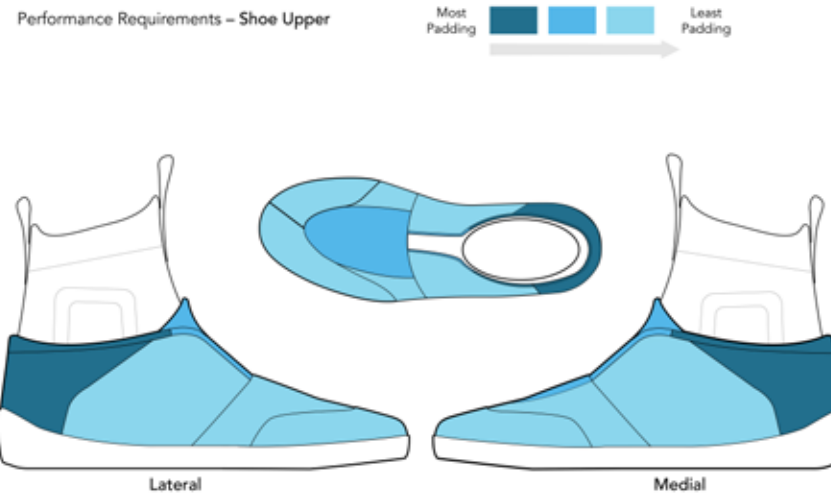
Matt Beare
The Daily Push - UK
Physiotherapy Student



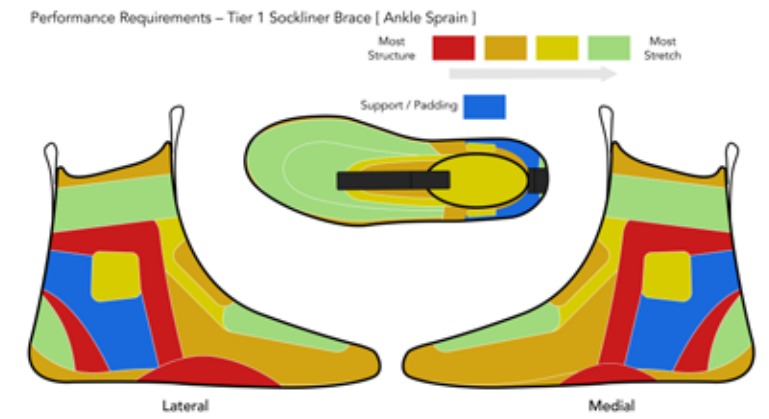
Dr. Pedowitz, MD
Rothman Institute
Associate Professor of
Orthopaedic Surgery
Thomas Jefferson Medical
College



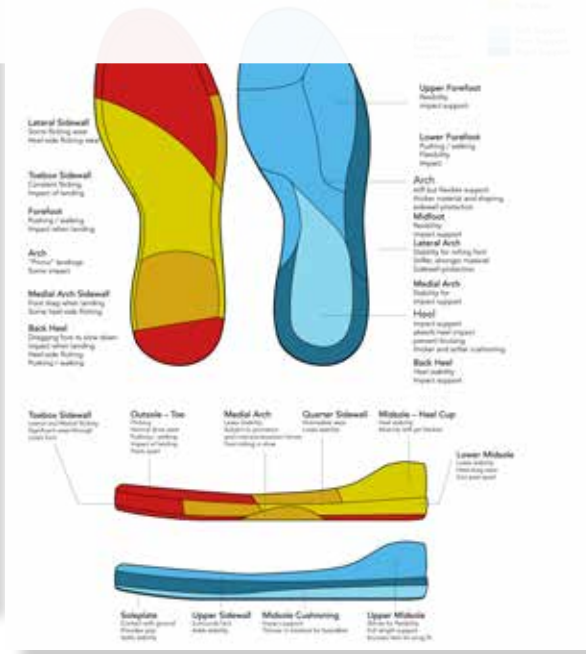
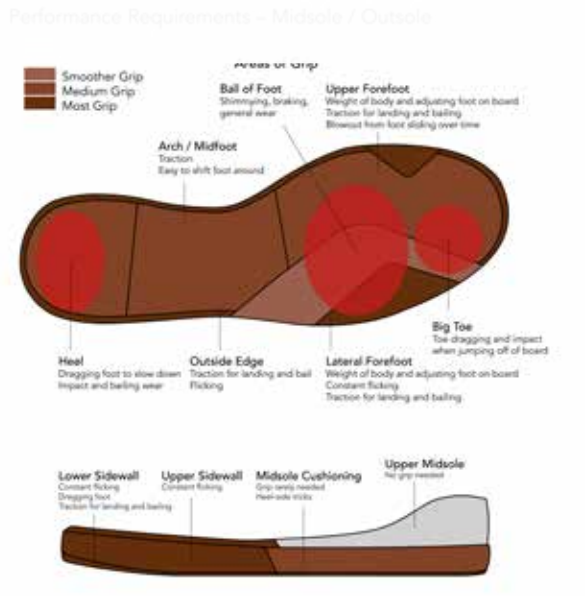
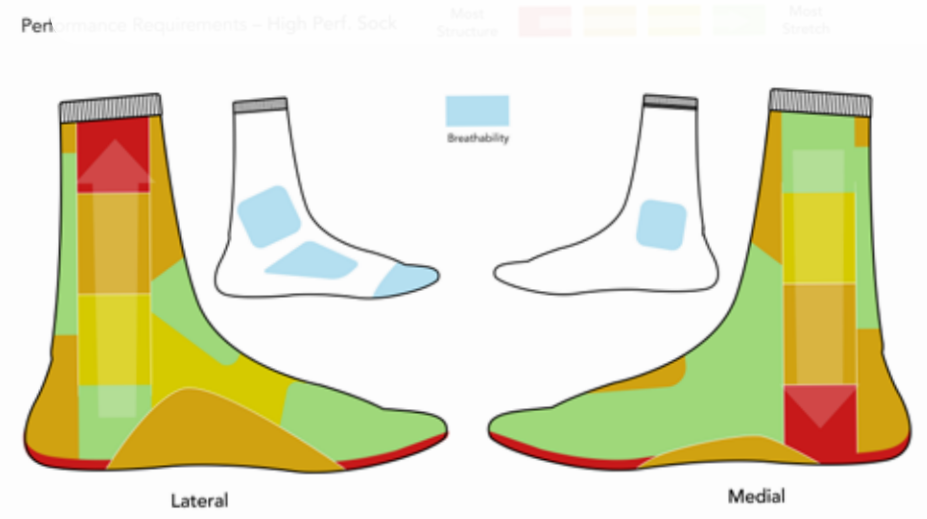
The material used plays a large role in the comfort and performance.



Focus on supporting the skater when they are skating and afterwards through the benefits of the material.



Provide supportive tension but allow for the needed range of motion.



Initial Concepts

I started out by presenting some initial concepts to skaters, and working through initial rounds of thinking of how the system might break apart. Initially I proposed concepts that featured a removable outsole, but I found that through talking to skaters and professionals, it seemed that the best methods of preventing injuries was less about innovating the construction of the shoe, and more about the material placement.



Nathan VanHook
Sr. Creative Director
Nike



Neil Kwiatkowski
Industrial Designer II
Smart Design

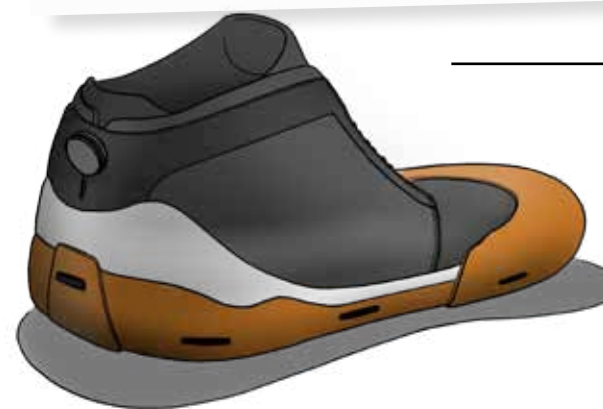
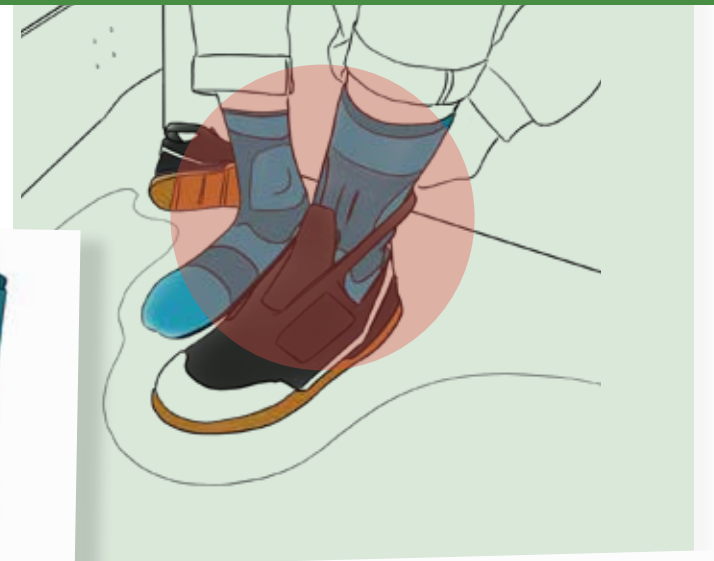


Alan Lugo
Bill of Materials Manager
Merrell
(Wolverine Worldwide)

“The injuries you mentioned are common injuries for runners and basketball players – I think if you look at ways those sports have attempted to solve those injuries it will give you a direction of how to engineer the midsole/outsole/insole tooling for your shoe.”
– Alan Lugo, Bill of Materials Manager at Merrell

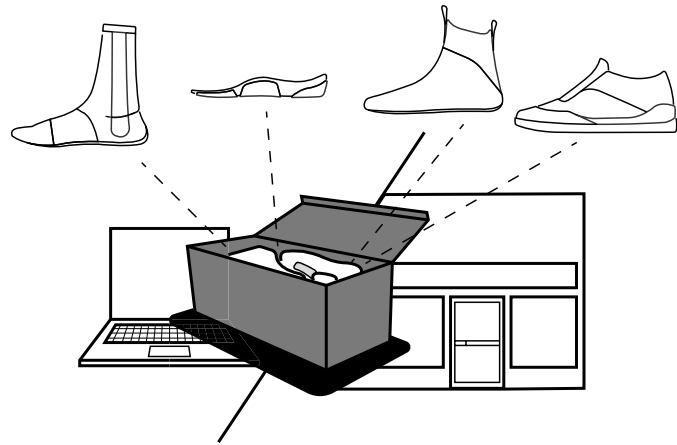


By integrating graphic prints into the brace/sock, it hides the safety intent and makes it more fun to wear.

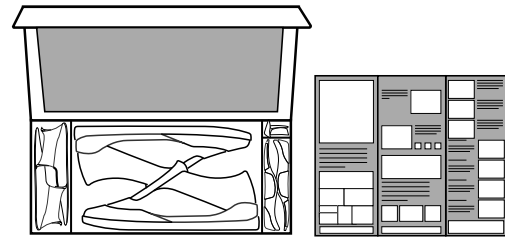


How It Might Work

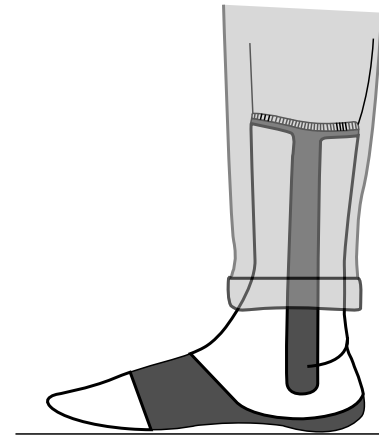
At that point, I had to think of how a modular “system” of a skate shoe might exist – there’s not really anything in the market currently in footwear that works this way. I considered different factors of how to influence a skater’s health, as well as how skater’s go about purchasing their gear. This exercise helped me raise some questions and considerations that I could bring forward as I developed the system.



Buy kit or individual products at local skateshop or online



Open up box, read exercise pamphlet and set up insole



Slide foot into sock and adjust to comfort

should the sockliner go into the shoe first, or onto the foot first?

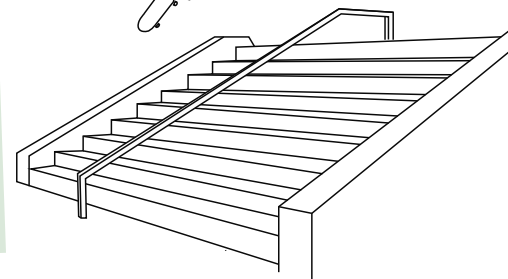


Slide sock into shoe and lockdown

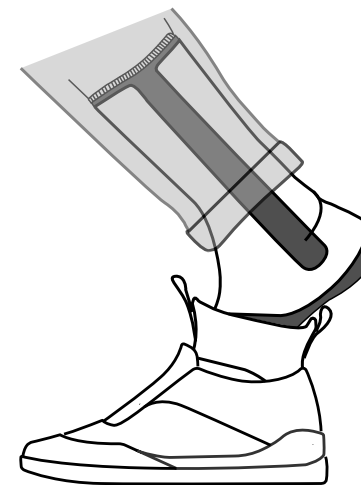


could this be easier to remember to do if you're wearing this system?

Warm up for skate session

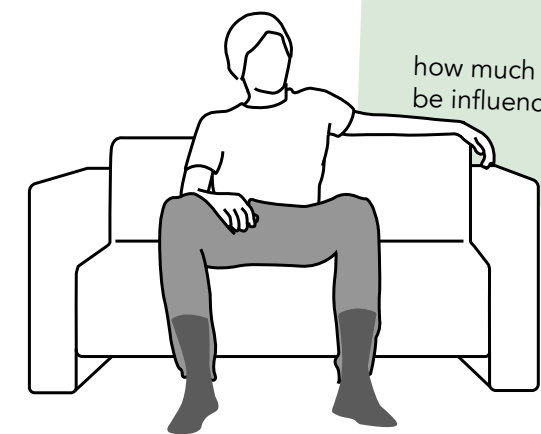


Skate!



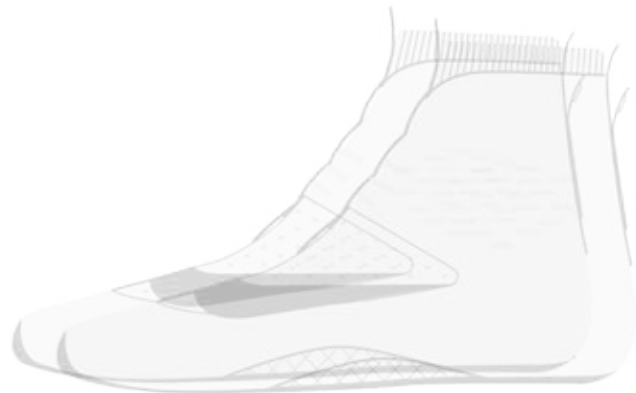
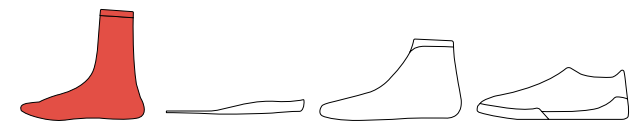
Go home, take shoes off

how does the sockliner latch into the shoe, and stay there?



how much can this be influenced?

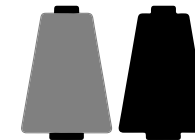
Cool down afterwards socks help with muscle recovery



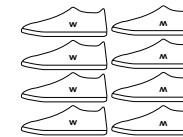
Stylish Patterns



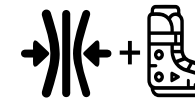
Protect the ankles and shins



Supportive materials and fibers



Design for women and men



Provide compression and proper, stiff support.



Provide hidden protection to work around the stigma of wearing protective gear.



- Shin padding
- Celliant performance yarn
- Compression patterns
- Heel cushioning

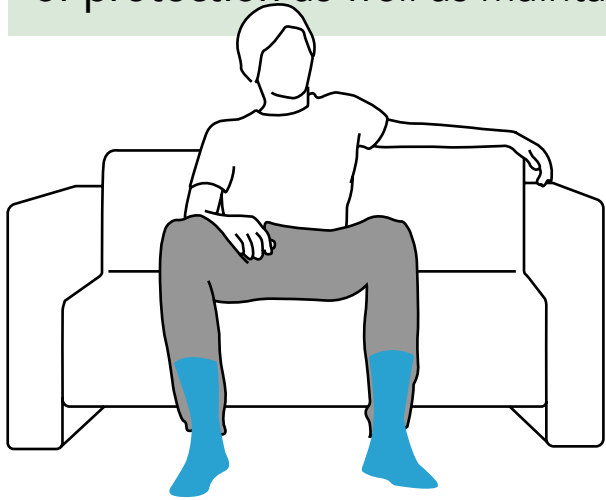
Performance Socks Initial Concepts

I began approaching the design of the socks through the kinesio-taping patterns that I had researched and developed with Monique – I began drawing these patterns on socks, and then labeling where different structures and directional compression would be placed.

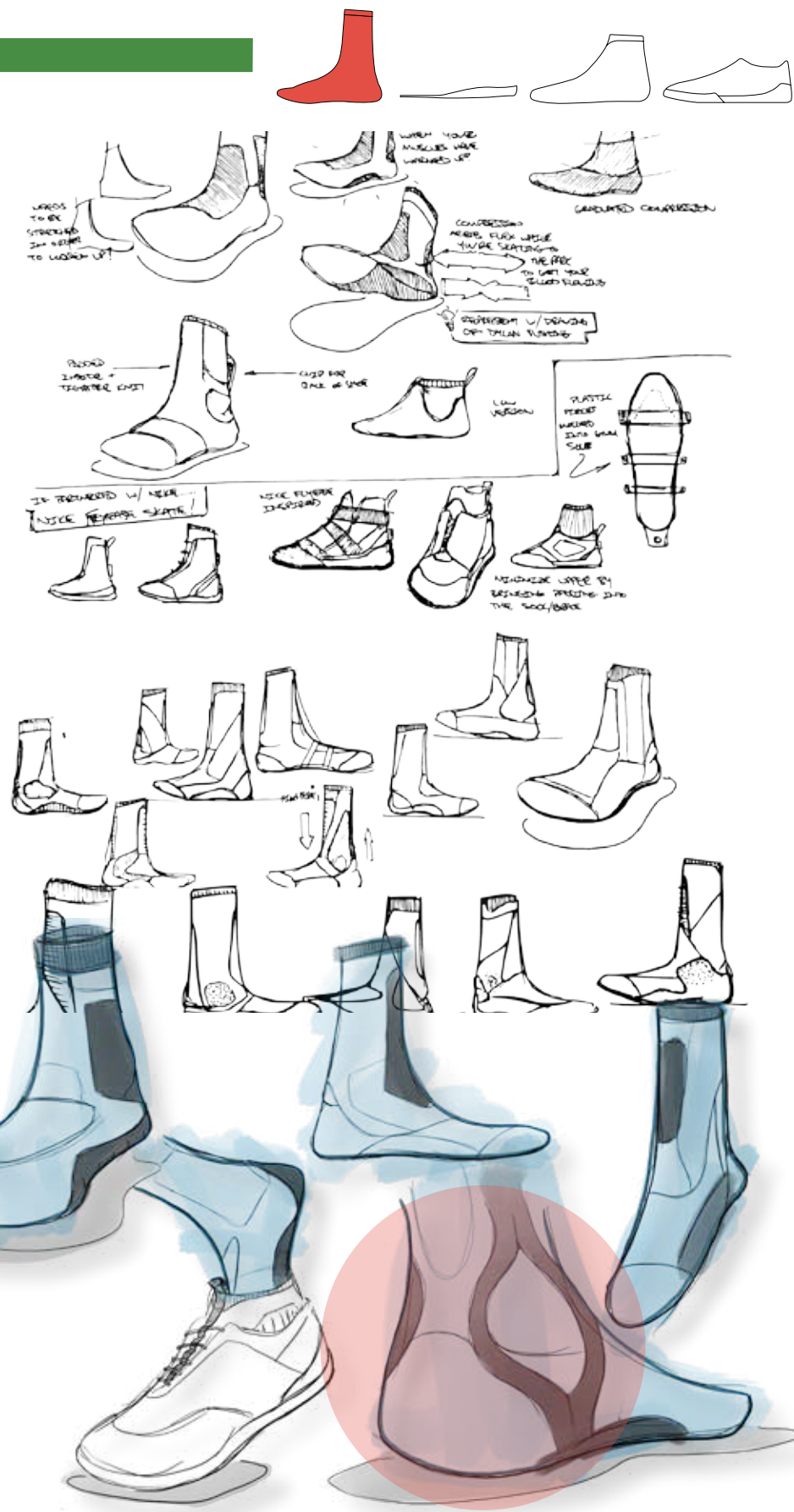
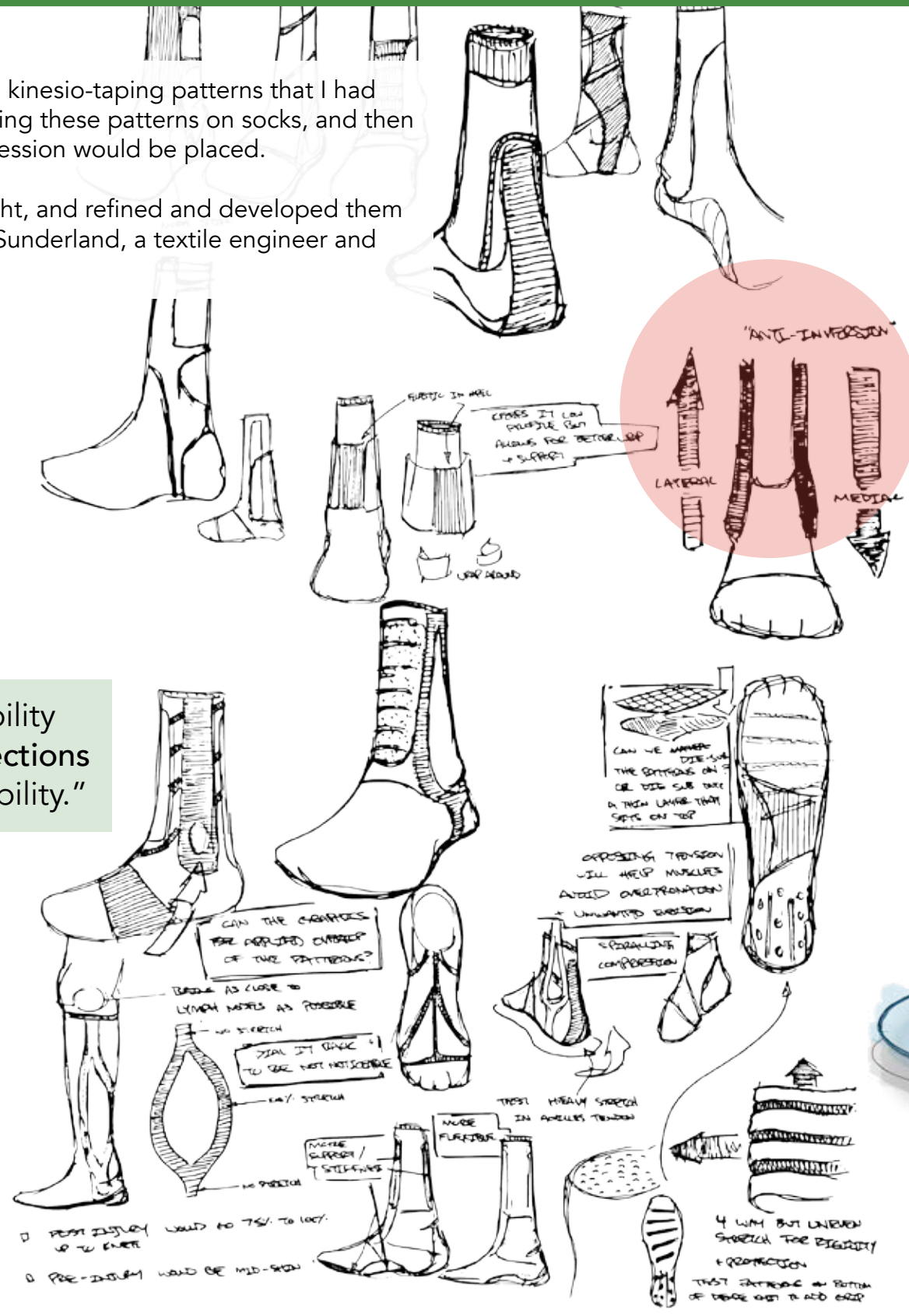
I then brought these patterns back to OT's got their insight, and refined and developed them into more technical views to begin discussing with Mark Sunderland, a textile engineer and the textile mill that I began working with.



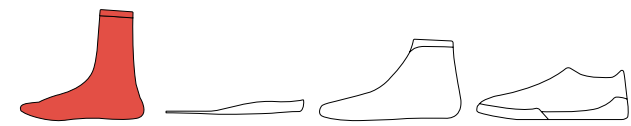
"I think you need to think about durability of the sock so maybe having zoned sections of protection as well as maintain durability."



Cool down afterwards socks help with muscle recovery



Kinesio-taping and Drawing Patterns

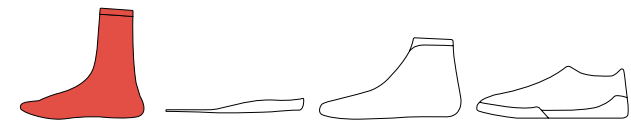


These kinesio-taping patterns that I was testing and learning from helped me identify how it might be best to support the ankle, heel, and arch. It became apparent that using an elongated stretch area along the side of the ankle and shin would help support ankle movement, but making sure that the compression and stretch went around the bone itself. Also avoiding too stiff of a pattern in the direct instep pocket was crucial, but having tension that wrapped over and around the front and back of the arch/instep felt supportive as well.

I then started mapping out these patterns onto socks, which helped me transfer them into more accurate and usable patterns off of a foot, and to get proportions correct. These translated into some of the early patterns that I used to communicate with the textile mill I was working with, Manufacturing Solutions Center in Hickory, North Carolina.



First Round of Performance Sock Prototypes



The first prototypes we developed featured a very soft yarn, and had a lower-placed front padding than we needed it to be. The sock needed to be extended farther up the leg as well. Overall though, the padding under the foot and the tight support pattern around the ankle was noticeable, and testing with skateboarders provided insight into how they felt.

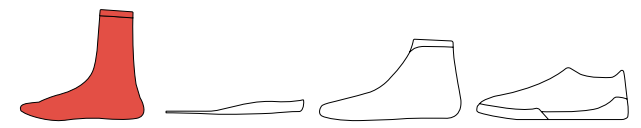


"They keep falling down but they feel pretty good."
– Erica Blair

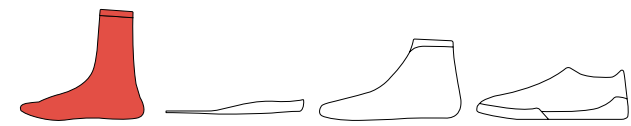


"You can definitely feel the cushioning under the heel and toes."
– Michael Bielawa





The second round of prototypes were elongated along the collar, and used a more specialized performance yarn from Unifi. The compression in the arch and around the ankle were amplified slightly for this round, and used color to highlight the different zones in line with one the of the colorways that I designed inspired by Guangzhou (see page 192).

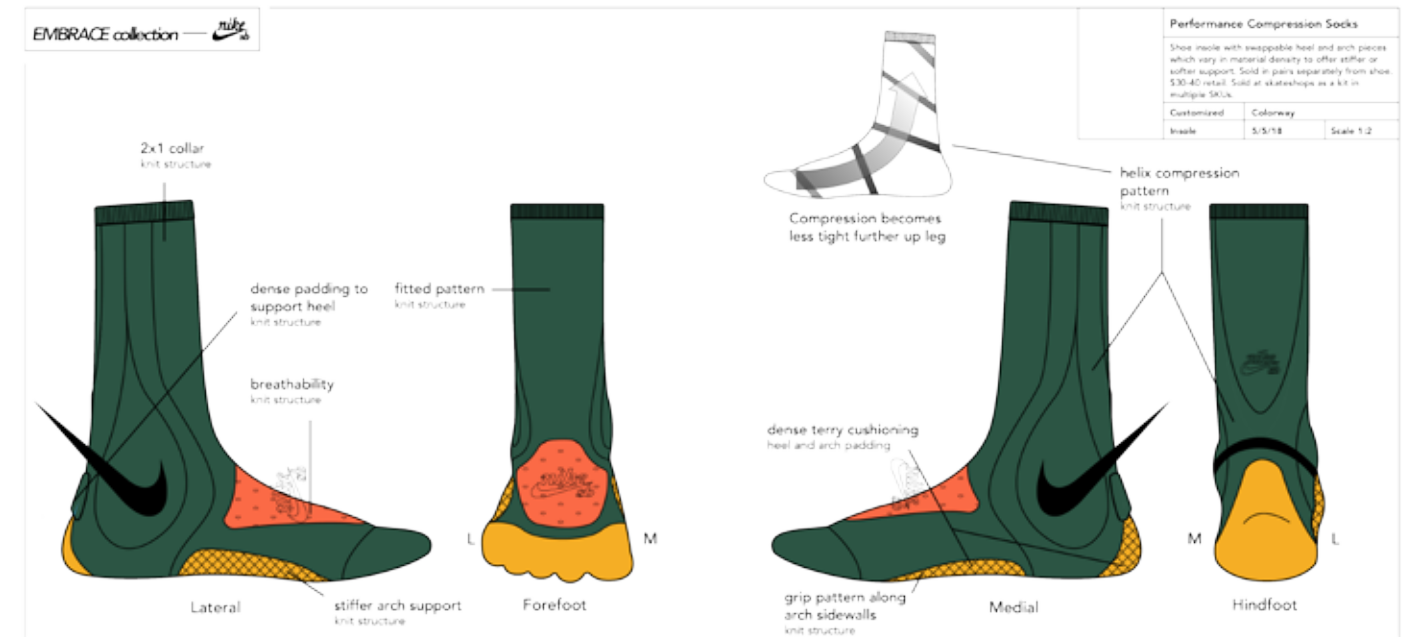
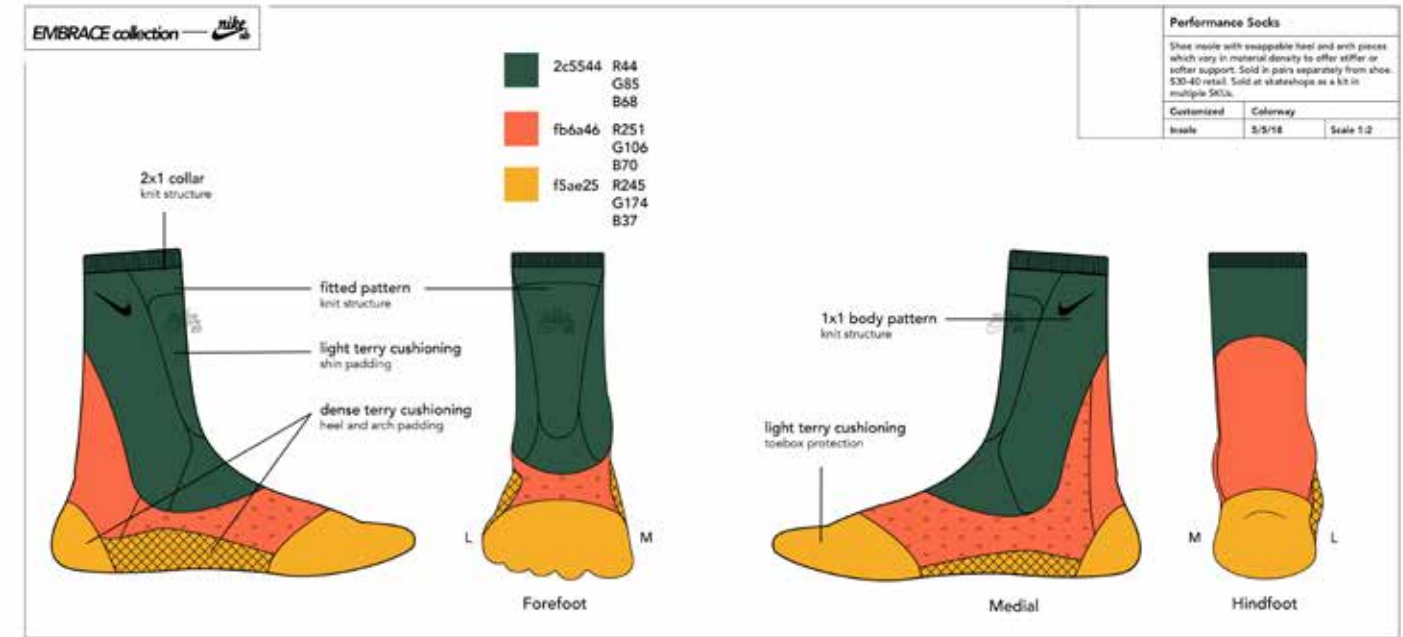


CELLIANT SOCKS

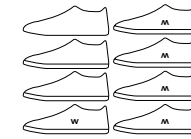
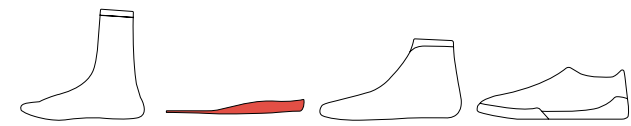
Celliant products are medical devices because they are intended to affect the structure or function of the body of man by temporarily promoting increased local blood flow at the site of application in healthy individuals.

- Celliant Products contain Infrared (IR) emitting ceramic particles
- Increase/More Energy
- Increase Thermal Energy
- This energy penetrates into the muscle and tissue to promote a temporary increase in local blood flow
- Better/More Endurance
- Faster/Quicker Recovery
- Enhanced/Increased Performance
- Increase/Enhance/More Speed
- Improve/Increase Strength
- Increase/More Stamina
- Recycled Human Energy
- Promotes Restful Sleep
- Helps increase comfort and promotes restful sleep
- Supports Heat Generation

"The FDA has determined that Celliant products are medical devices as defined in section 201(c) of the Federal Food, Drug and Cosmetic Act and are general wellness products."



Moving forward, I proposed working with the Celliant team to integrate their performance yarn into the sock. Celliant fiber features infrared-emitting particles, which helps to increase bloodflow, which can help to not only benefit the wearer's performance, but also in the recovery process for their muscles as well. This would be very beneficial to skateboarders, who often do not warm up or cool down when they skate.



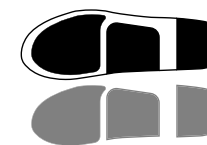
Design for women and men



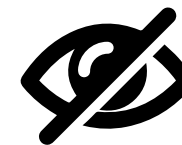
Stylish Patterns



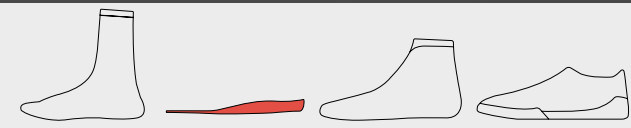
Balance quality and comfort with longer lasting materials



Customization



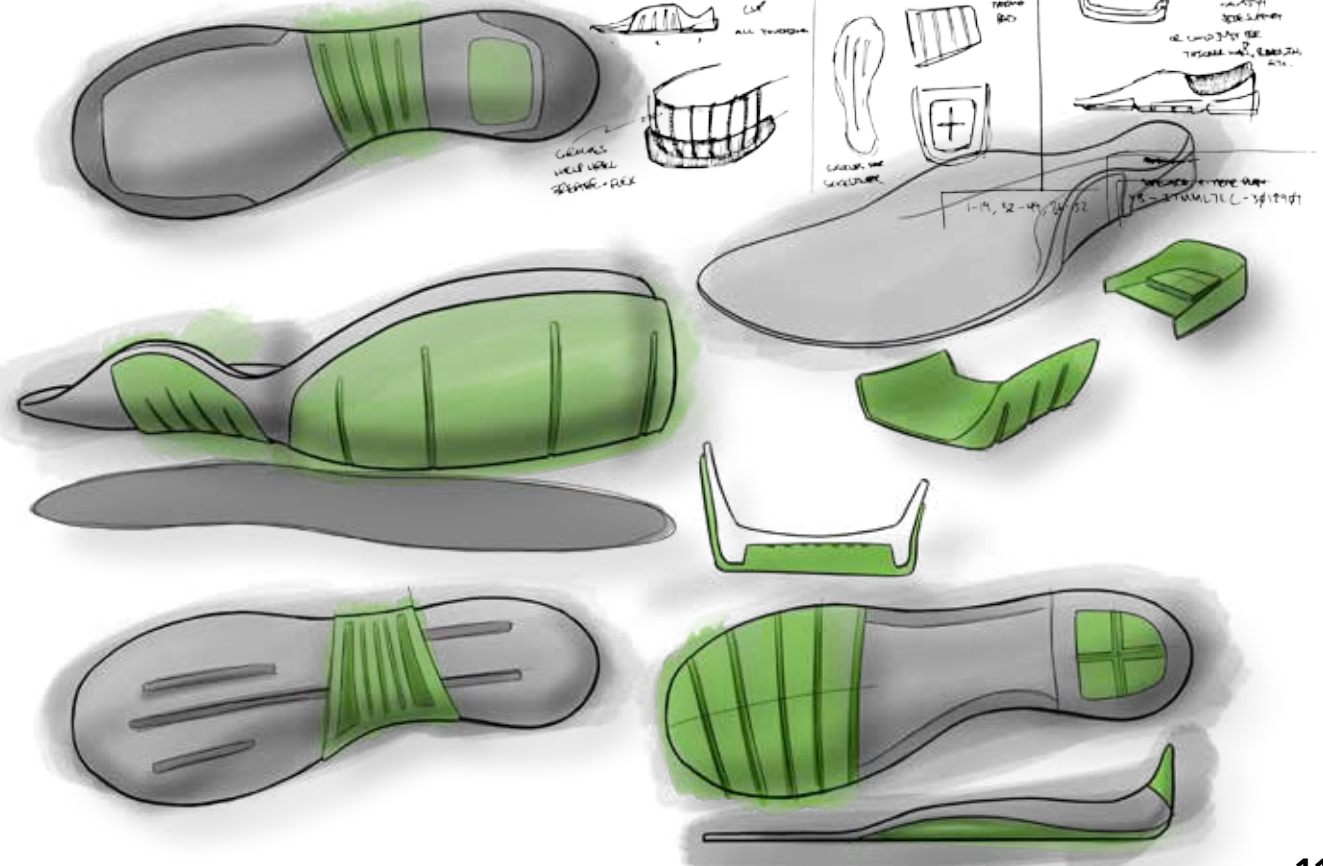
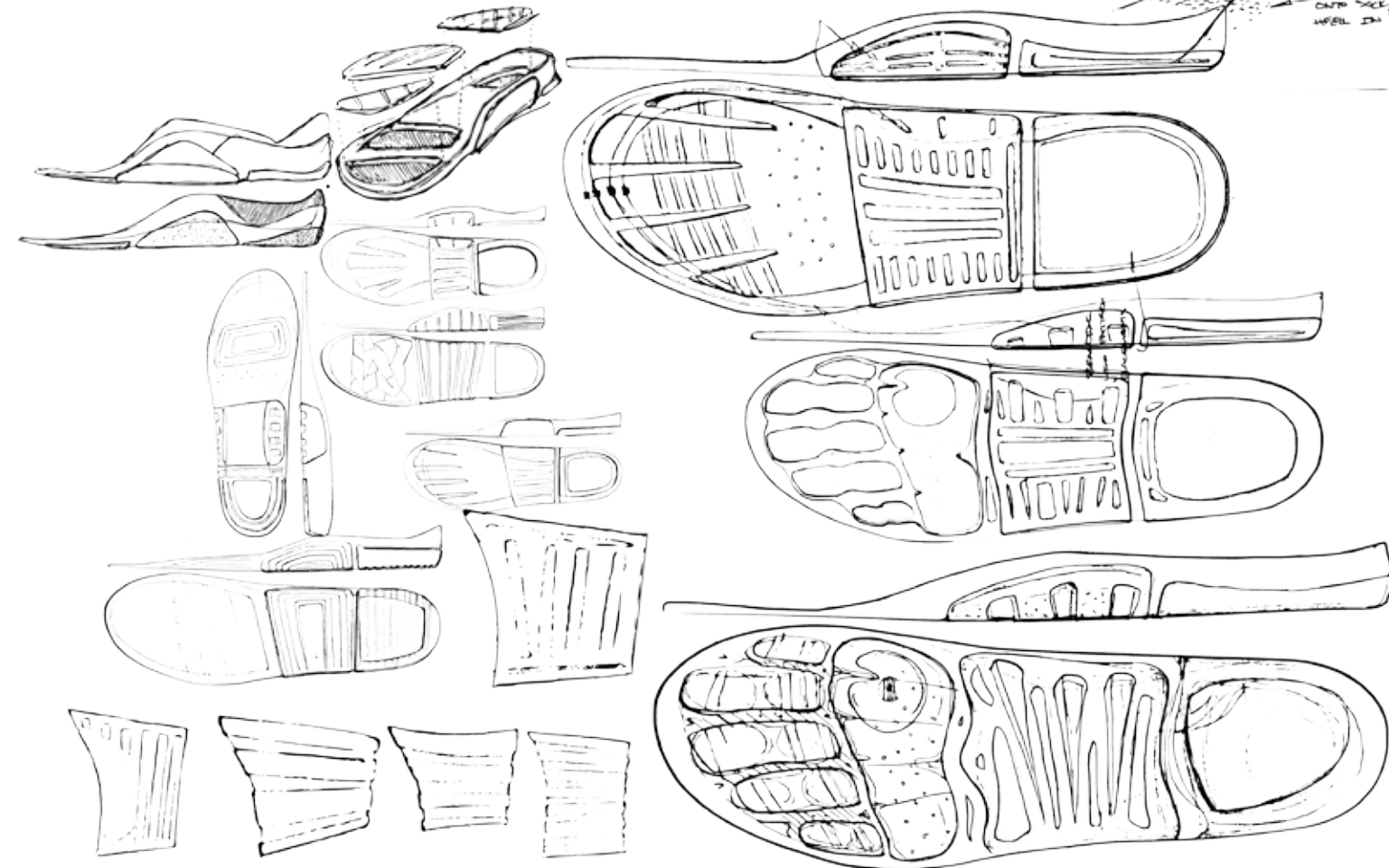
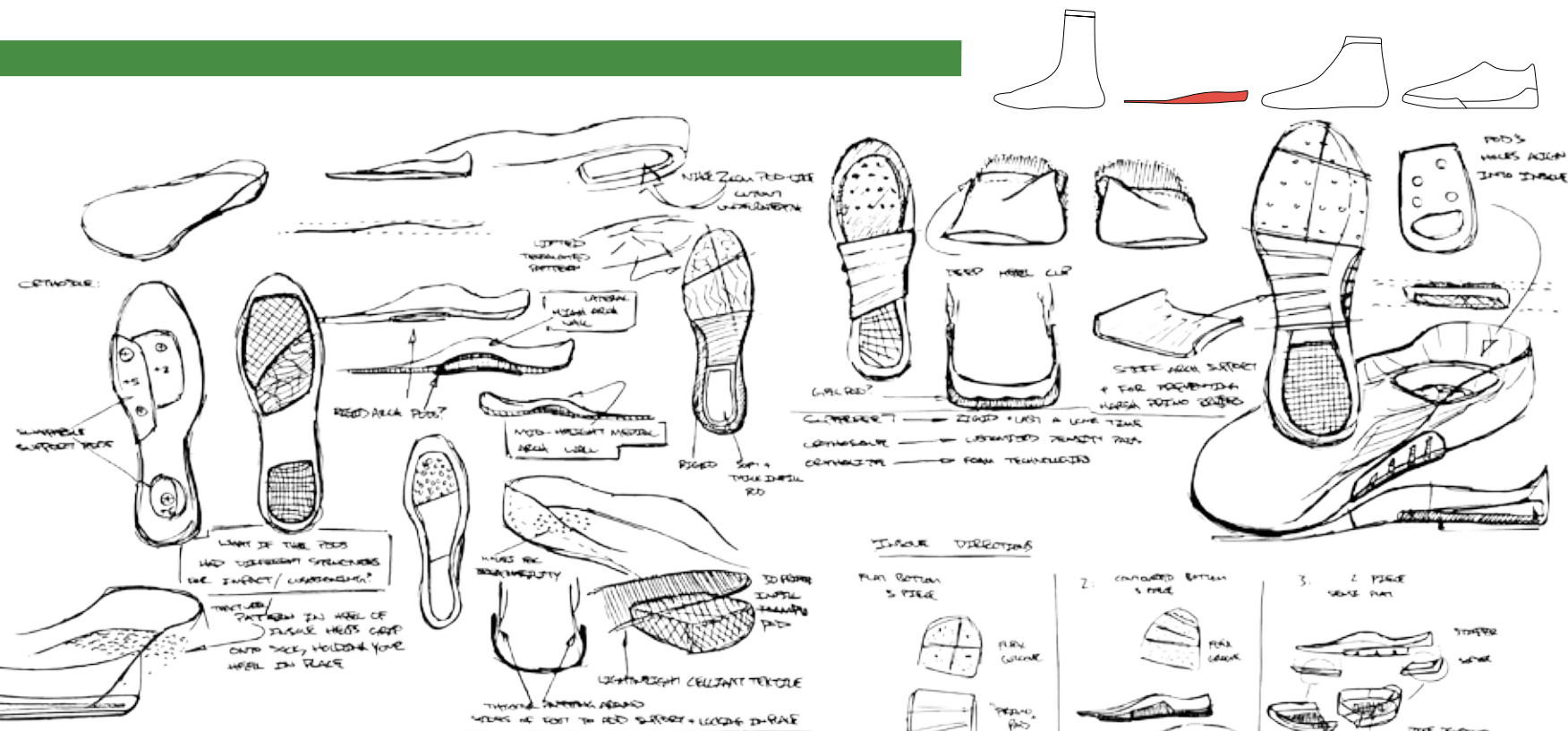
Provide hidden protection to work around the stigma of wearing protective gear.



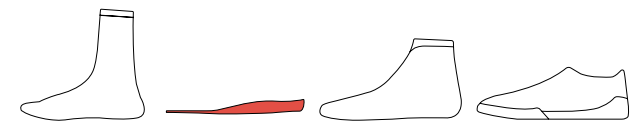
- Heel Cushioning
- Odor resistance
- Arch support
- Customized fit
- Trim-to-fit
- Breathability

Modular Insole – Initial Concepts

For the modular insole component of the system, I knew I needed to develop an insole that was not flat, and contoured better to the foot than traditional skate insoles. I knew I wanted it to support the main areas of the foot – the arch, heel, and forefoot. Based on some of my early ideation, I knew I would need to reach out to some experts in orthopedic products, as well as to begin doing my own tests for the shapes and contours I was thinking of.



Modular Insole – OrthoSole and Testing



In my market research for performance insoles, I came across OrthoSole, a customizable insole product intended for elevating the comfort inside of shoes for the average person. Ronnie Irani, founder of OrthoSole and former professional Cricket player, was excited to talk to me about my project and how I wanted to do something similar for skateboarders.

We discussed manufacturing, development material selection, and how to market the product to skateboarders, who are much more picky and counter-culture in their approach to these types of products.

I also kept in mind other insoles that functioned similarly; ones that had removable pieces, and ones that did not.



Footprint Insoles



Some of the initial concepts for the modular insole.

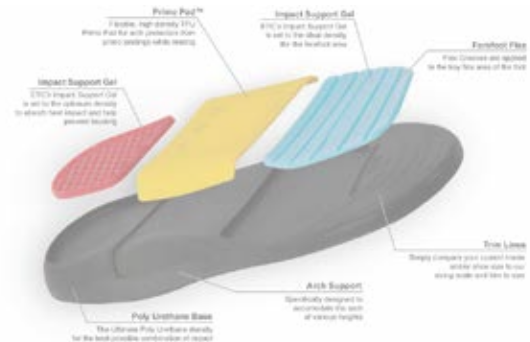


Ronnie Irani
Former Prof. Cricket Player
Founder of OrthoSole



OrthoSole

"Your feet are your eyes."
– Ronnie Irani, founder of OrthoSole

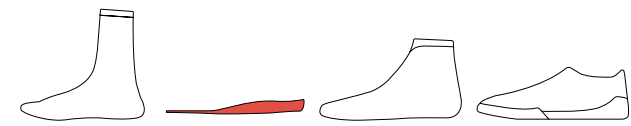


Etcetera Skate Insole



I gained hands-on experience with many types of insoles to see which felt and performed the best, and which held up to their claims.

Modular Insole Prototyping and Testing



I took some of my initial concepts and did early mockups of layers foams and other materials to feel how they compressed.

I then began using Rhino to develop contoured forms, and testing with users to see which felt proper and the most supportive to their arch and heel. I began sharing these concepts with Derek Wilson of MatPlus, and orthotics supply company. He gave me insight not only in the material I would use, but how to develop the modular system.

"You're going to be able to influence the arch and the heel the most I think. The toebox and forefoot are typically more guided by your last's shape, and you don't want to interfere with the flex of the shoe and the front of your arch. Those areas are where you can make the most impact."
 – Derek Wilson, MatPlus



Derek Wilson
Business Dev. Manager
MatPlus Inc.



"The feel of a different insole can take a while to get used to, and I think swapping out different parts of the insole depending on what you want to skate might be seen as too much of a hassle to actually do mid-session, but could be helpful if they don't have to change it out often."
 – Matt Beare, The Daily Push

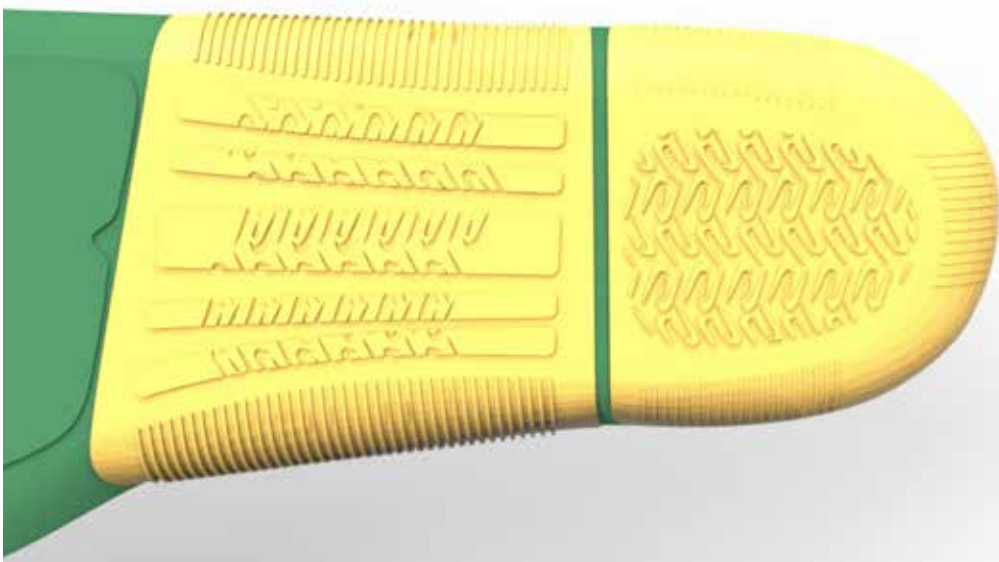
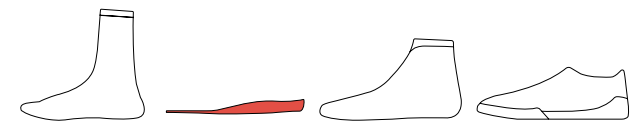


Heel cushion piece iterations.

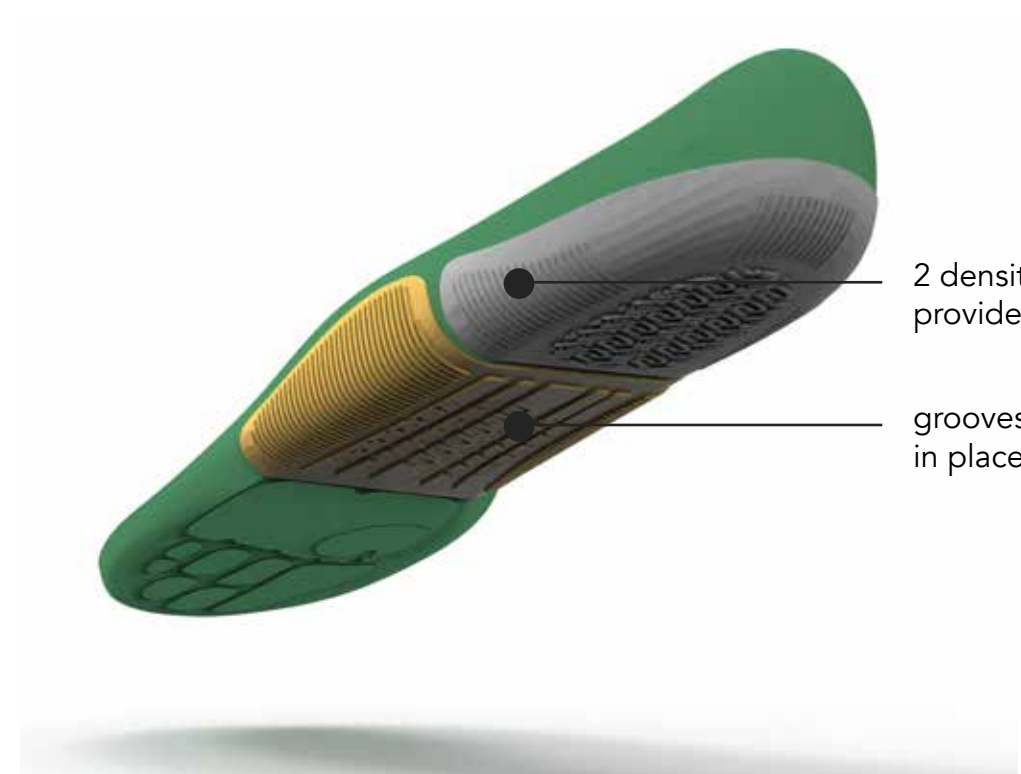


Arch support piece iterations.



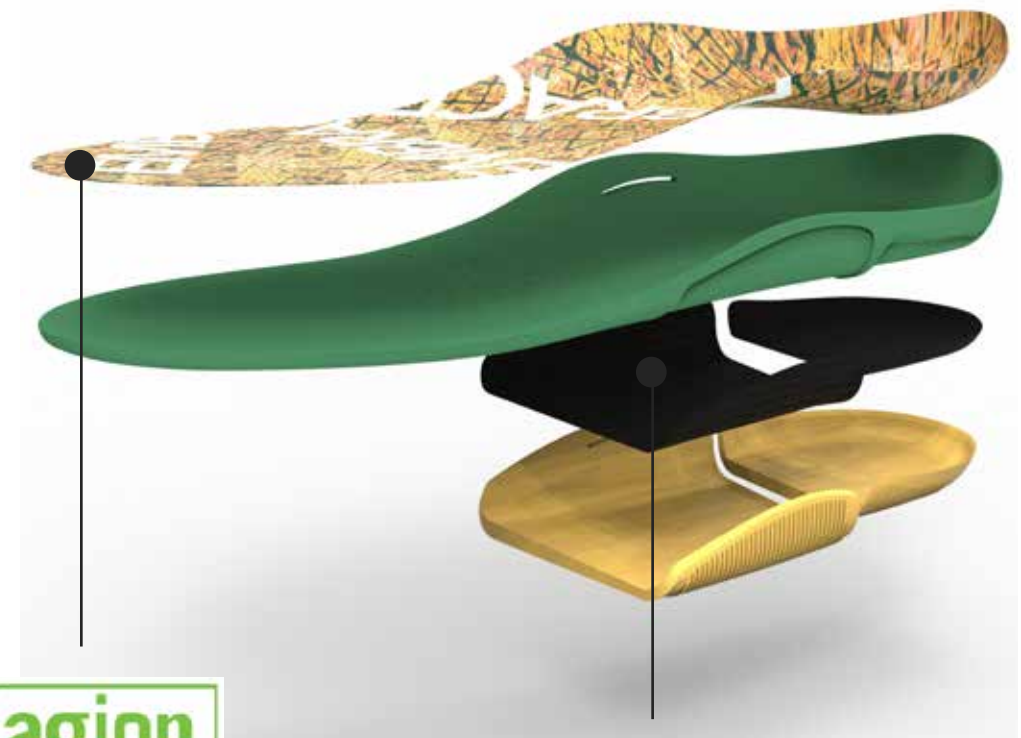


*"I don't see anything wrong with your insole design at all – material placement, the concept, it makes sense."
– Dr. Pedowitz, The Rothman Institute*



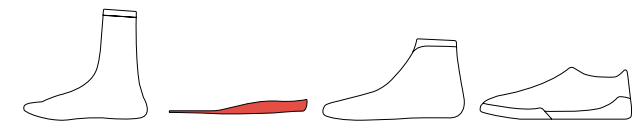
2 densities of pieces to provide many options

grooves help insole stay in place inside of brace



Agion anti-microbial coating

Velcro holds removable pieces in place



Purchase the insole kit from your local skateshop



Open the insole kit packaging



Remove the insole base pieces (2) and the modular arch and heel pieces (4 + 4)



Choose the piece density that matches your type of skating and comfort needs and snap onto the velcro zones of the insole bases

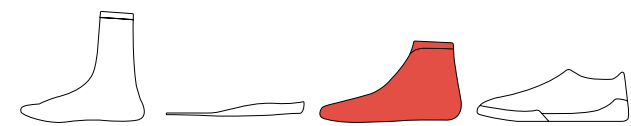


Insert the assembled insoles into the removable brace piece.



Insert the brace into the skate shoe and lace it up.

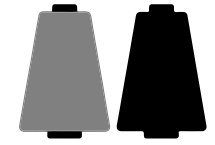




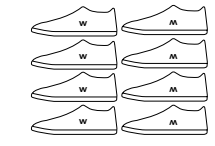
Stylish Patterns



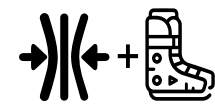
Protect the ankles and shins



Supportive materials and fibers



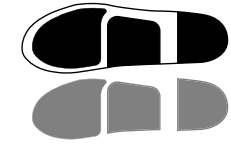
Design for women and men



Provide compression and proper, stiff support.



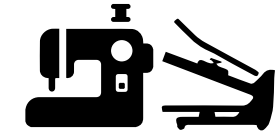
Provide hidden protection to work around the stigma of wearing protective gear.



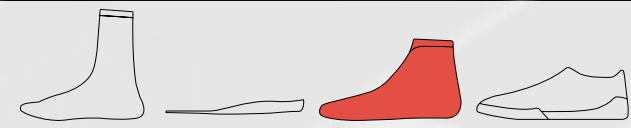
Customization



Balance quality and comfort with longer lasting materials

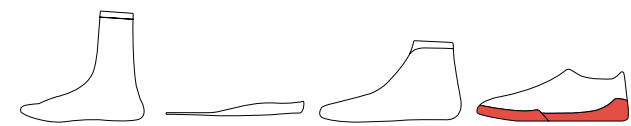


Innovative textile construction



- Ankle Support
- Celliant performance yarn
- Snug internal fit
- Customization per foot
- Heel support
- Breathability
- Lateral / medial arch support
- Brace versions
- Machine washable

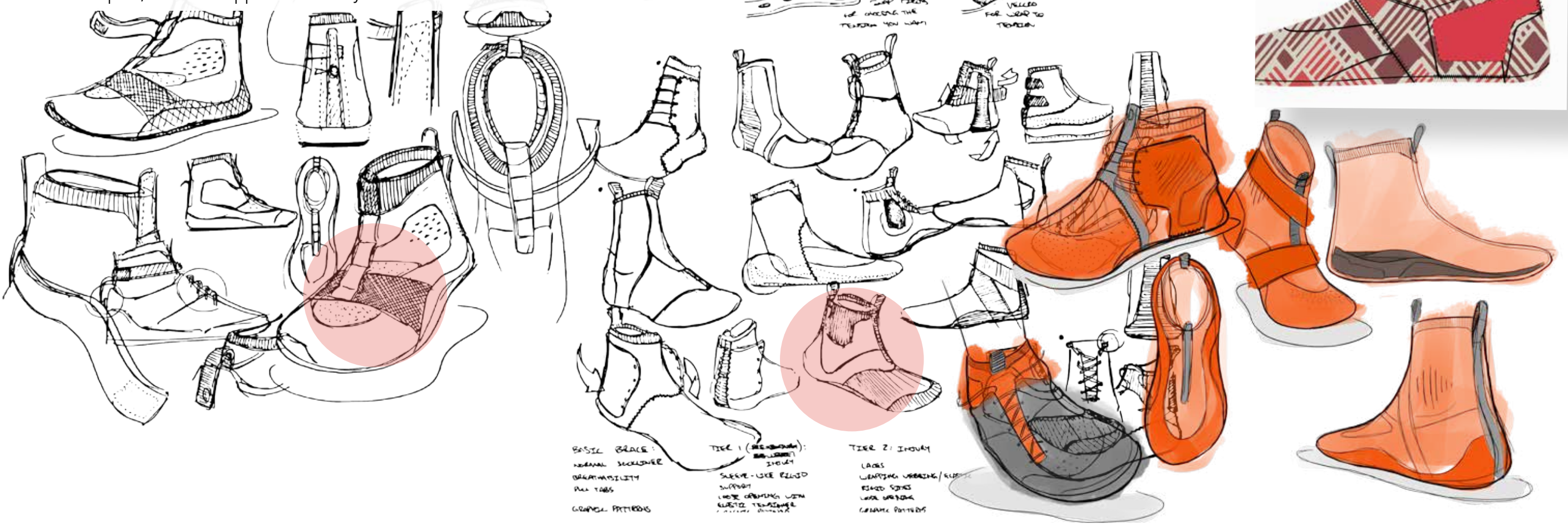
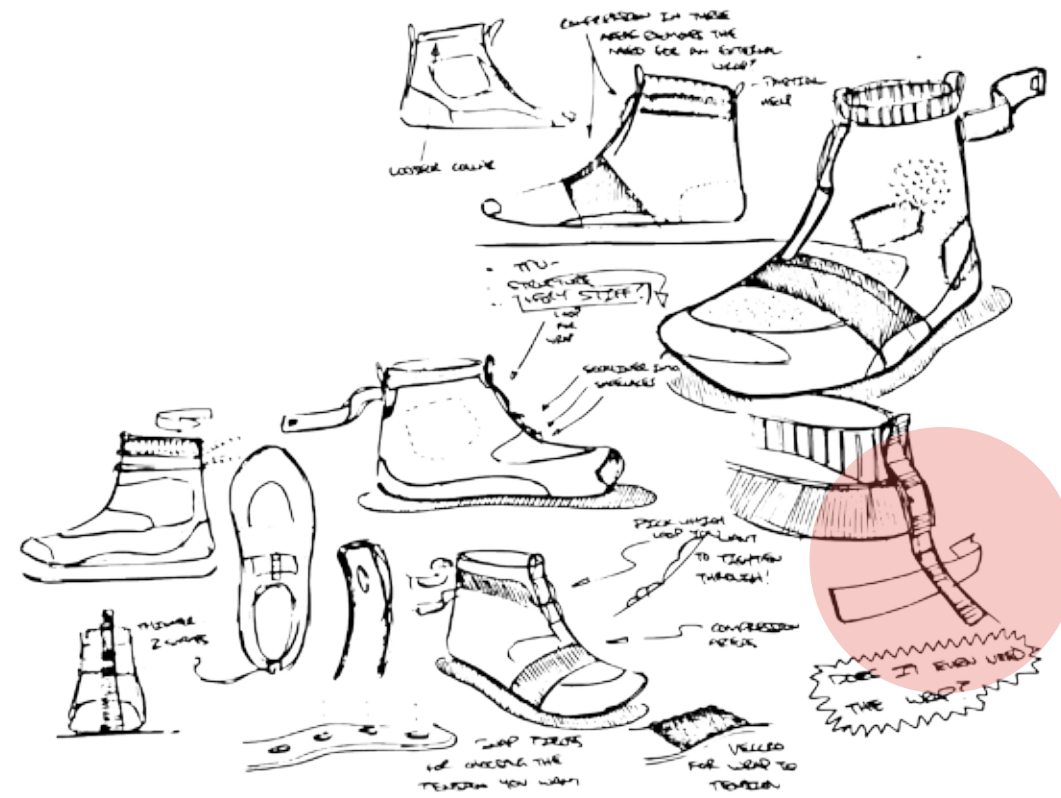
Initial Removable Brace Concepts



For my initial concepts of the removable brace "sockliner" component of the system, I referenced back to my performance analysis for the sock to make sure I would not be interfering with the structures of the sock in the next external layer from the foot.

I knew that the removable brace would need different versions - a "standard" version for when you are not injured, a version for when you've got an ankle injury, as well as a version for when your heel is injured, whether it be from heel bruises or a need for additional heel cushioning and support.

I took these sketches back to OT professionals as well as shared them with skateboarders to get their thoughts on how this would insert into the shoe, what became too complex, and what appearances they would want to see it in.

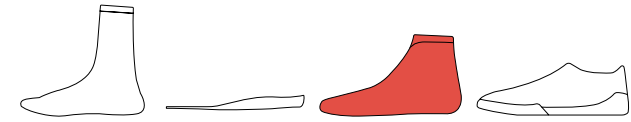


BASIC BRACE:
 NORMAL SOCKLINER
 ORGANIZABILITY
 ALL TABS
 GRAPHIC PATTERNS

TIER 1 (RECOMMEND):
 SLEEVE-LIKE RIGID SUPPORT
 MORE OPENING WITH ELASTIC TENSIONER
 ALL TABS

TIER 2 (INFORM):
 LACES
 LEADING WRAPPING / RIGID STRIPS
 LACE WRAPPING
 GRAPHIC PATTERNS

Initial Removable Brace Prototyping



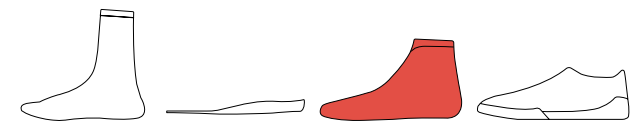
From my insights discussing with professionals, I began taking a similar approach to the removable brace as I did with the performance socks. I used normal socks and inserted pieces of foam into them, underneath them, in order to see how the removable brace should interact and be connected within the shoe system.

"It's not about the material thickness - it's about the support."
- Monique Chabot



"Super hyped to see the sockliner in there for skating. I have trainers with that and it's a game changer."

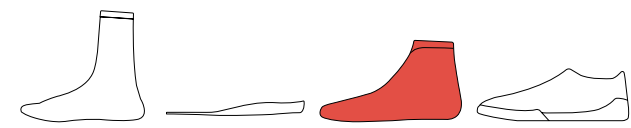




One feature I needed to figure out was how to keep the removable brace in place within the shoe. I began testing different 3M GM series grip patterns to see which patterns provided the proper amount of resistance and ease of going in and out of the shoes. I came to the conclusion that I would actually not need the material at all, as it was more important to allow the removable brace to contour and move with the foot itself, and instead to be locked-down to the shoe in the lace area and along the heel tab rather than underneath of the foot.



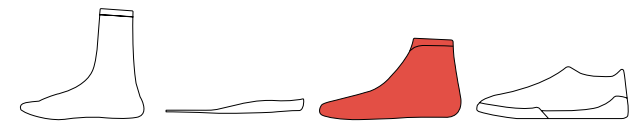
Some of my first mockups were intended to just figure out a form that would slide and fit inside of a skate shoe, and that I could insert my foot into while it was inside of the shoe. This became the better way to put the system onto the foot, rather than the brace onto the foot, then into the shoe. From these prototypes, I also tested different wrap patterns that would be used in accordance with the ankle and heel brace versions of the brace.



I made many prototypes to test what structure would fit best inside of the shoe, as well as whether or not I needed a base that functioned as a secondary strobil material. Since the insole was going to sit on top of this, having a stiff, flat structure worked great, except it made the brace fit much tighter and didn't exactly contour to the user's foot. Additionally, heel and front tabs were added to help pull the brace up and to lace into the shoe.

"What you need is a hugging, compressive fit, and many braces use materials that are more forced to be tight. It seems like the sockliners and the knit material will do just that, but without the awkward force."
 – Dr. Pedowitz, The Rothman Institute

Final Removable Brace Prototypes



Celliant performance yarn promotes bloodflow leading to more energy, increased performance and faster recovery.



Agion anti-microbial coating

Brace can be easily folded up and washed like a normal sock

Grilon low-melt base yarn for added stiffness

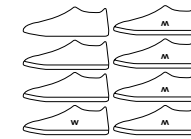
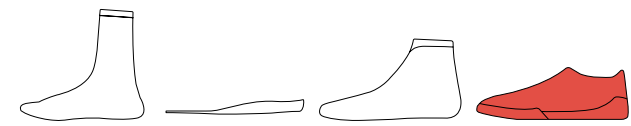
Ankle support structure

Light stretch pattern for breathability



“What you need is comfortable support. Highlight the areas of support and assistance – let them [skaters] know they are there to help.”
 – Dr. Pedowitz, The Rothman Institute

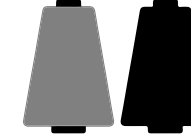




Design for women and men



Stylish Patterns



Supportive materials and fibers



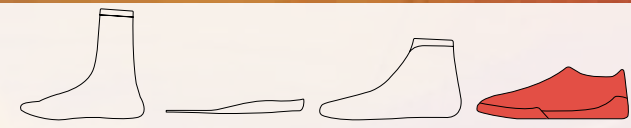
Balance quality and comfort with longer lasting materials



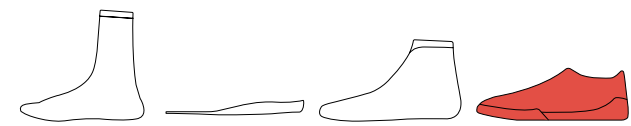
Address the impact on the environment



Provide hidden protection to work around the stigma of wearing protective gear.



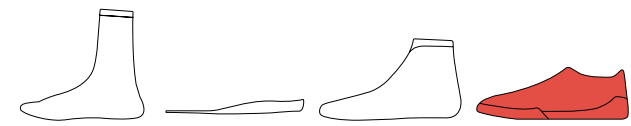
- Emboss pattern for lace and vamp protection
- Asymmetrical lacing
- Culturally inspired patterns
- Internal lace loops
- Breathability
- Abrasion-resistant upper materials
- Eco-friendly foams, synthetic suede + leather



For the development of the skate shoes, I made sure to keep in mind the other elements of the system that I would need to accommodate for, which also helped to drive the material placement within the shoe. Before I could move much further into the detail of the upper design, I needed to begin mocking-up and prototyping different constructions.



Handwritten notes: 'INCREASE LACING', 'FEEL COMING ON FEEL', 'TRUCKS CENTERED'.



My initial upper patterns were focused on working with proper materials like suede and sandwich mesh. I was also beginning to test new patterns using lasercutting, and some initial samples of warp-knit composites to achieve different structures and appearances.

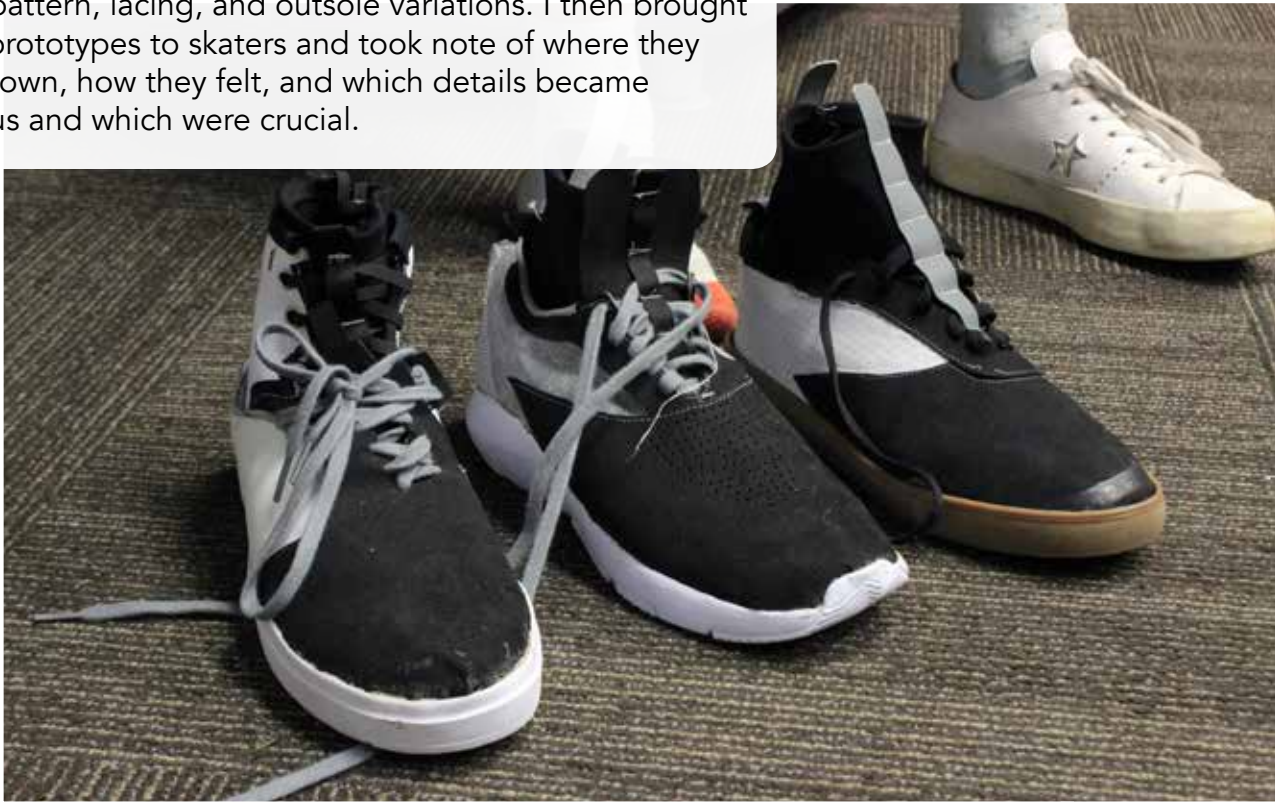
Because of the insertion of the removable brace, I had to make adjustments to my patterns to prevent wearing and ripping from that process. Each of these prototypes was also being mocked-up with my early midsole tests as shown in red and white 3D printed plastic.



Skate Shoe Development – Round 2



My second round of prototypes was based on narrowing down pattern, lacing, and outsole variations. I then brought these prototypes to skaters and took note of where they worn down, how they felt, and which details became frivolous and which were crucial.

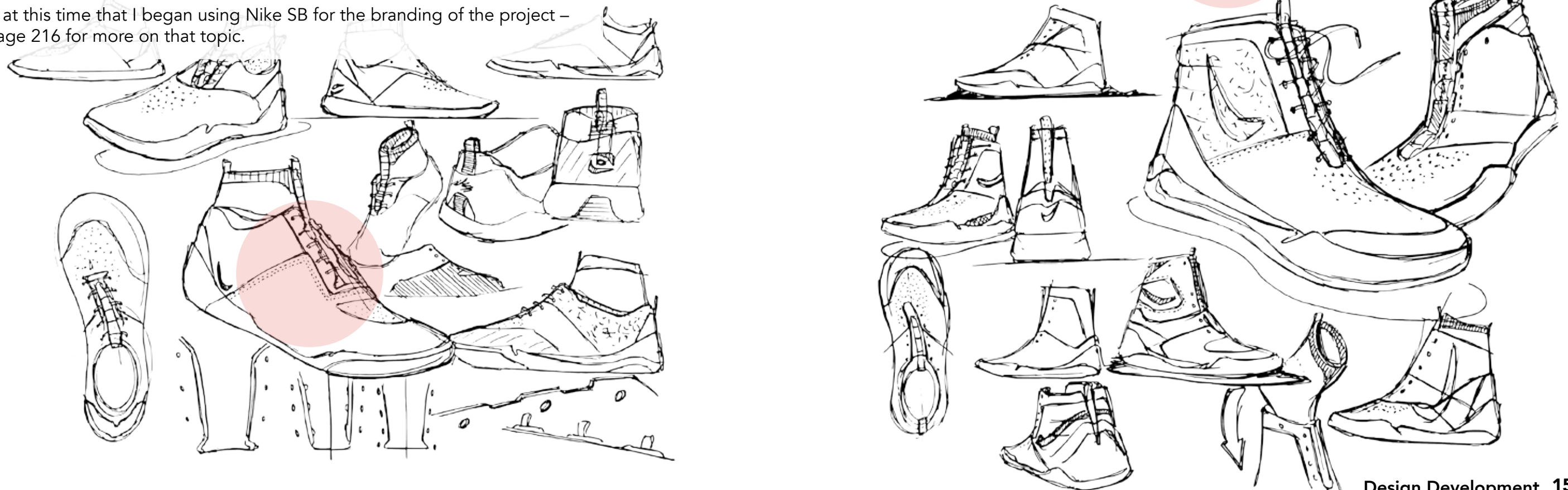


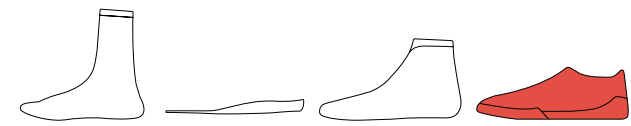
Further Ideation



After identifying the type and style of upper construction that I was going to use, I went back to the drawing board and iterated many designs for the upper, combining my performance analysis and my new takeaways.

It was at this time that I began using Nike SB for the branding of the project – see page 216 for more on that topic.



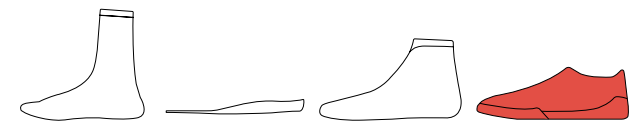


My third round of prototypes was the first physical models of the final design that I had come to. I developed the physical patterns and cut out the materials that I would also use for the final models to simulate the construction as best as possible.



I used the second generation of the jacquard pattern (see page 198) that we developed, as well as foams for the emboss features, TPU hot-melt for the toecap, and a synthetic suede for the main exterior patterns.

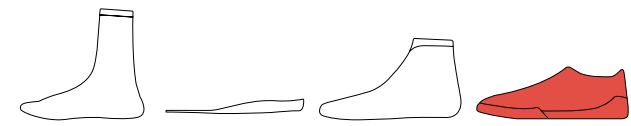




Once I had made adjustments to the initial final pattern prototypes, I made my first full pair – these would be the skate test models. I had designed an informed and realistic upper, but I needed to validate that it would work, especially out of the materials that I was suggesting. From this pair, I knew what I needed to improve on for the final models, and that my design was working.

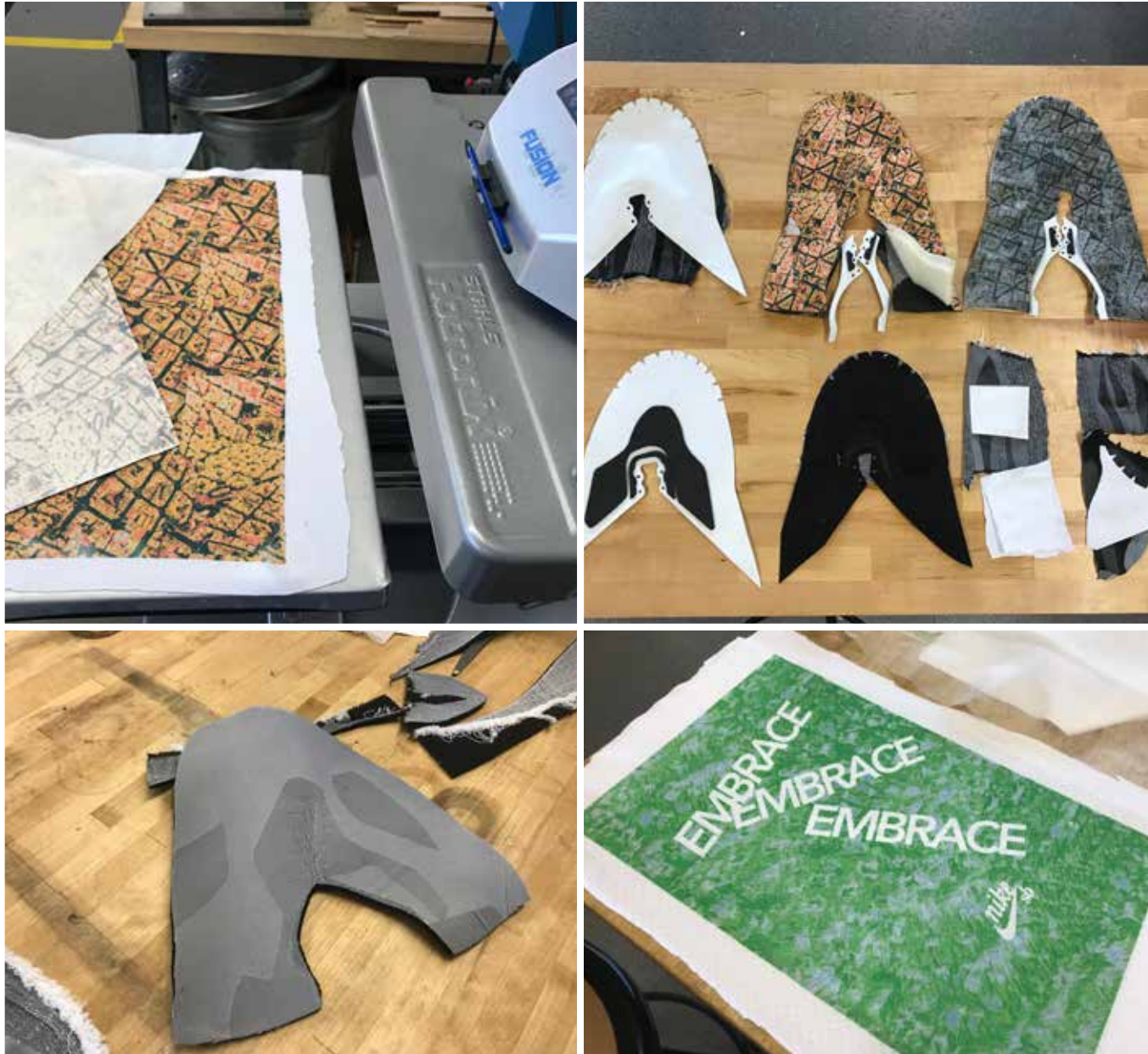


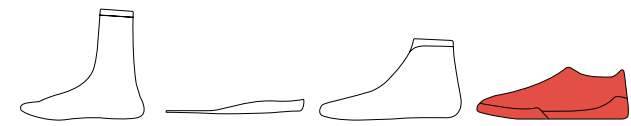
Pattern Preparation



These photos show some of the process I went through when preparing my patterns. I used a laser-cutter to pre-cut all of my pattern pieces, then used die-sublimation and warp-knit fabrics to build the upper with the intended patterns. Once I had all of the pieces layered, I would begin assembling the upper, which only needed a few seams, mostly attaching the exterior leather/suede in the needed abrasion areas.

I then repeated this process for the final models, where I used different patterns that Regan and I had developed, and brought them up to Brooklyn ShoeSpace in Brooklyn, New York to get a more traditional and professional experience building the final pairs.

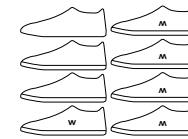
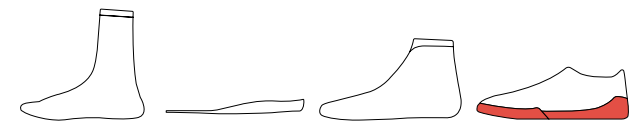




During my trip to Brooklyn ShoeSpace, I had the opportunity to share my project and designs with the BKSS team. Throughout the 3-day intensive workshop, we worked through layering the materials, sewing the pattern pieces, and helping me optimize the construction method from what I was doing previously in order to have a better fitting and performing shoe. By the end of the weekend, I had sewn, lasted, and soled both pairs of my concept shoes.

Thank you to Keiko, Yuji, Rebecca, and Bonnie of BKSS for making this experience an enjoyable and fruitful one, and for helping me push my project farther.





Design for women and men



Stylish Patterns

Supportive materials and fibers



Balance quality and comfort with longer lasting materials

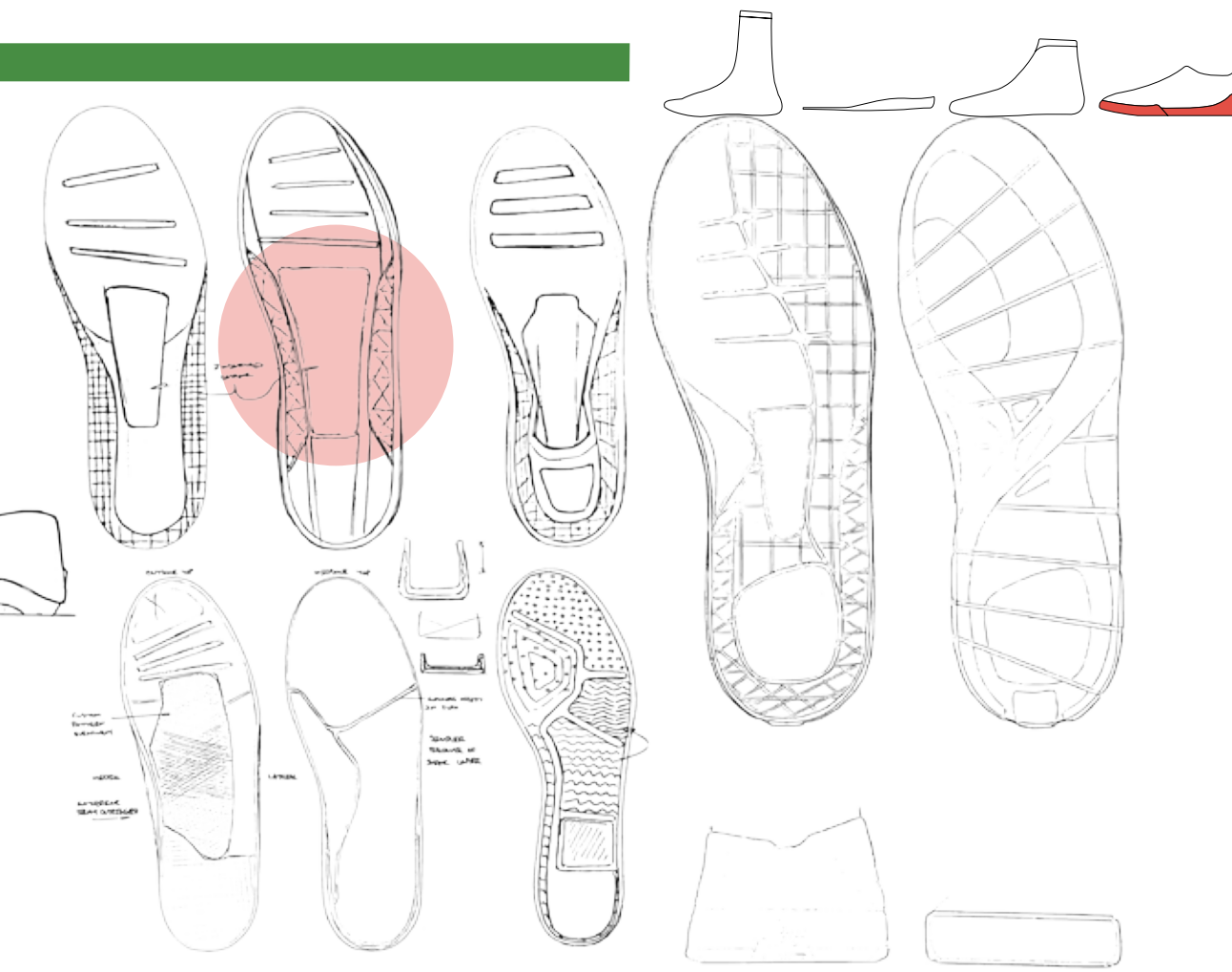
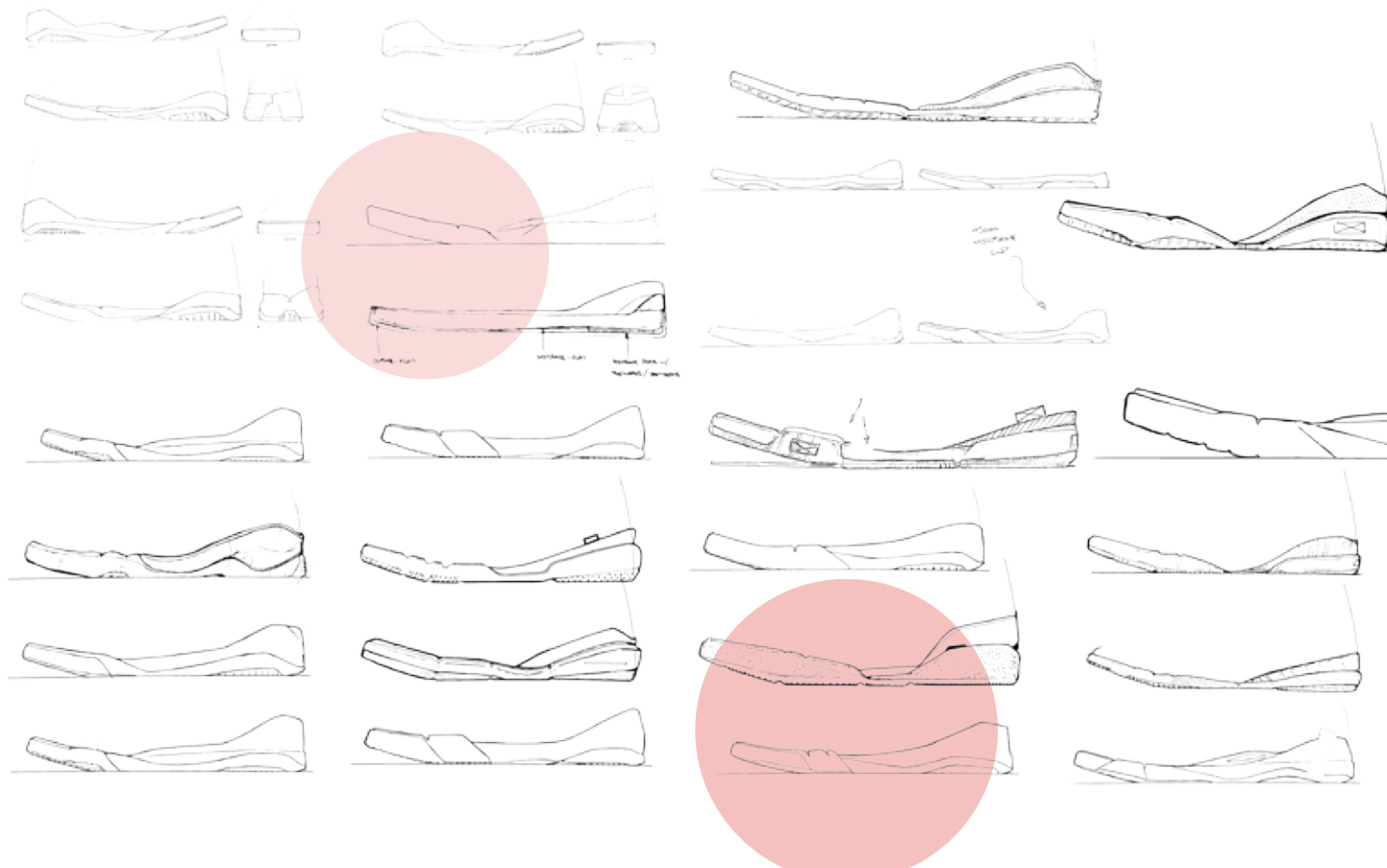


Address the impact on the environment

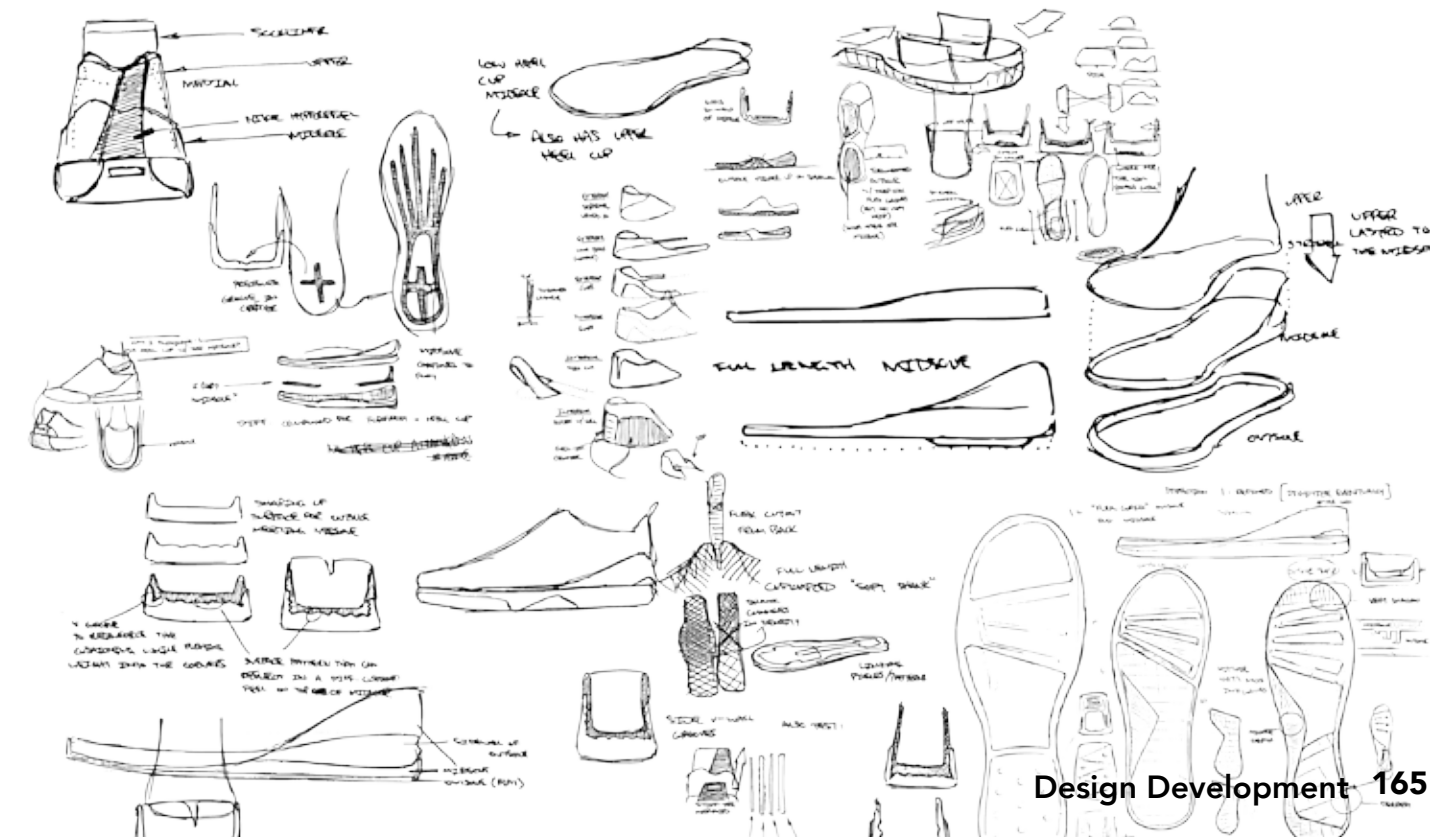


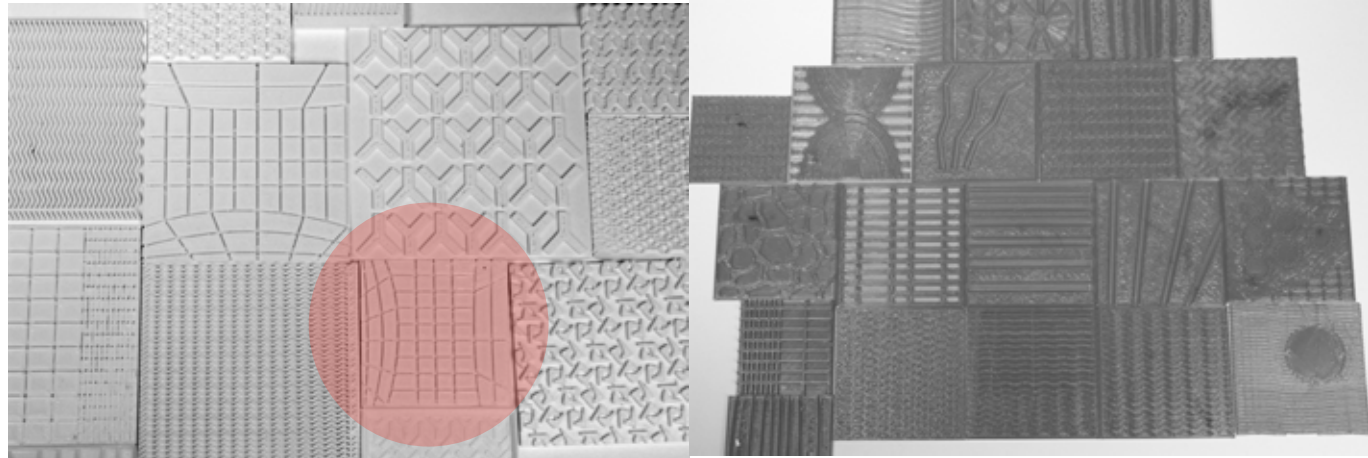
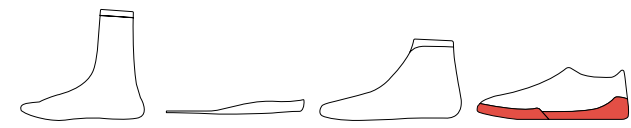
Provide hidden protection to work around the stigma of wearing protective gear

Initial Sole Concepts

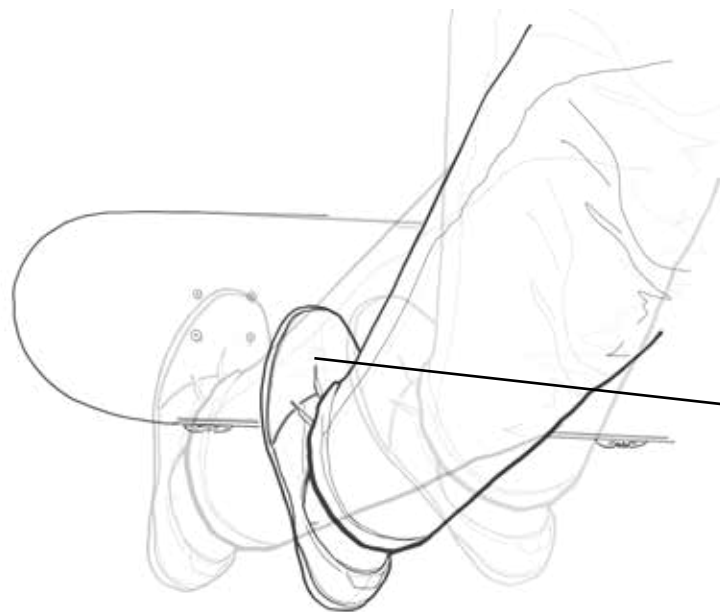


My initial development for the outsole was inspired by a mixture of reference skate shoes and the performance criteria that I had developed. I wanted to integrate subtle but assistive details that would help the outsole and midsole become more stable without adding significant cost. Some of these features were the flex grooves in the forefoot, the interior ridging that changed from the forefoot to the heel for zonal stability and midsole adhesion, and the full-depth midsole coming through to the ground surface in the arch area and in the heel. These were key features that based on my footwear experience and researching skate shoes, would work to help add support and stability. However I did have a new feature that I wanted to integrate – an elastomeric shank that would be integrated into the arch area of the outsole, covered by the midsole, and hidden from the skater’s foot. My thought was that this would help add stability and support under the arch of the foot, especially protecting it from landing “primo” or on top of the side of the skateboard which can be very painful. This type of feature is more common to mountain biking and hiking shoes. However, I needed to test this before I could be certain to integrate it into the design.





When it came to designing the tread for the bottom and sidewalls of the sole, I had a large number of reference skate shoes to learn from. Much of what dictates the pattern on the bottom itself is not as important as is the placement of the general style of pattern in the right place – having more diagonal grooves in the forefoot would wear and behave better than in the heel. Regardless, I decided to create many flexible small models of patterns I was considering in order to test their flexibility, tolerance, and scale. These patterns were not only intended for the bottom of the shoe, as some were designed for the internal ribbing structure on the inside of the outsole where it meets the midsole.



Most skaters “shimmy” their foot before a trick, as a method to quickly find their ideal foot position and to set their balance. This consistent motion creates heavily worn zones on the outsole, and requires a harder rubber and a smoother but still grippy pattern.



Very low heel cup, not enough support for the foot.

Good heel cup height, but goes too far along the medial sidewall.

Too high along the heel to be able to put foot in and out of the shoe.

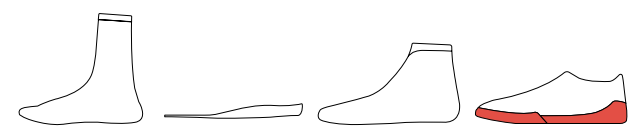
Lower but still supportive.

Too far along the sidewall towards the front of the shoe, would cause an awkward flex in the forefoot.

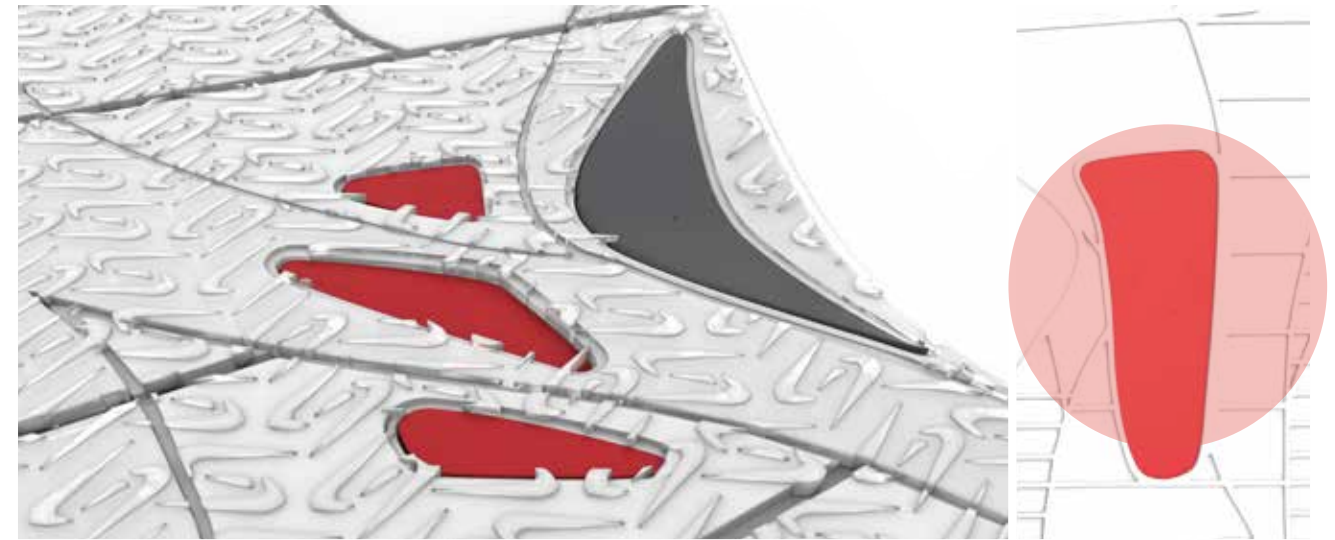
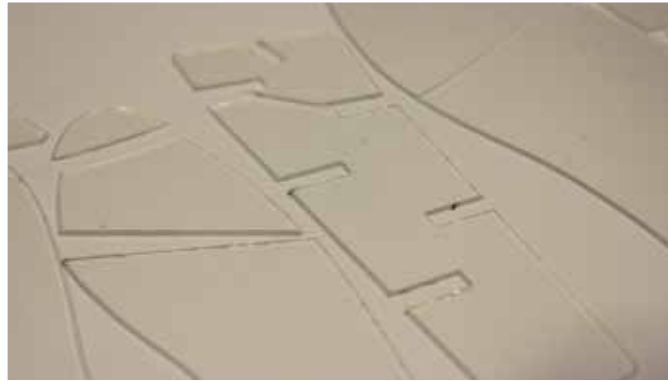
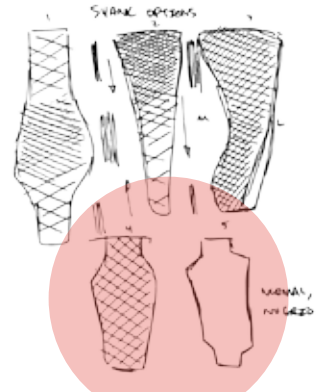


I wanted to use an external heel cup that was the same piece as the midsole, allowing for a more indirect but supportive cupping that eliminated pieces. I was also testing to see what type of midsole contour would work. I did a combination of flexible and stiff 3D-prints to test how the contours of the potential midsole impacted not only the visual aesthetic of the shoe, but also how difficult it was to put on and take off. Most skate shoes have an internal heel cup, which is made from a stiff board and is glued into the layers. This creates a solid heel cup, but can often wear through and cause blistering, and adds more glue to the shoe construction.

Shank Testing



For the shank testing, I had come up with some initial designs to test a variety of shapes that could help me isolate which might work the best. I then cut out a strong but flexible plastic to these shapes, and inserted them into skate shoes and testing with skaters to see which were more noticeable, assistive, or awkward. I moved forward with a simple shape, which did not interfere with the flex of the forefoot of the sides of the foot, but still provided enough stability.

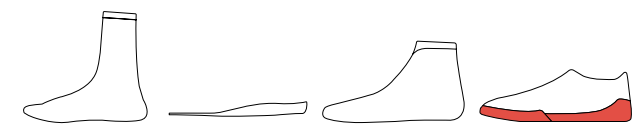


Based on feedback from Nathan VanHook of Nike, I wanted to figure out a way to celebrate the design of the shank, let skaters know that it was there, but to also have it be subtle. I integrated low-relief cutouts in the outsole to expose the shank through the outsole, as shown above.



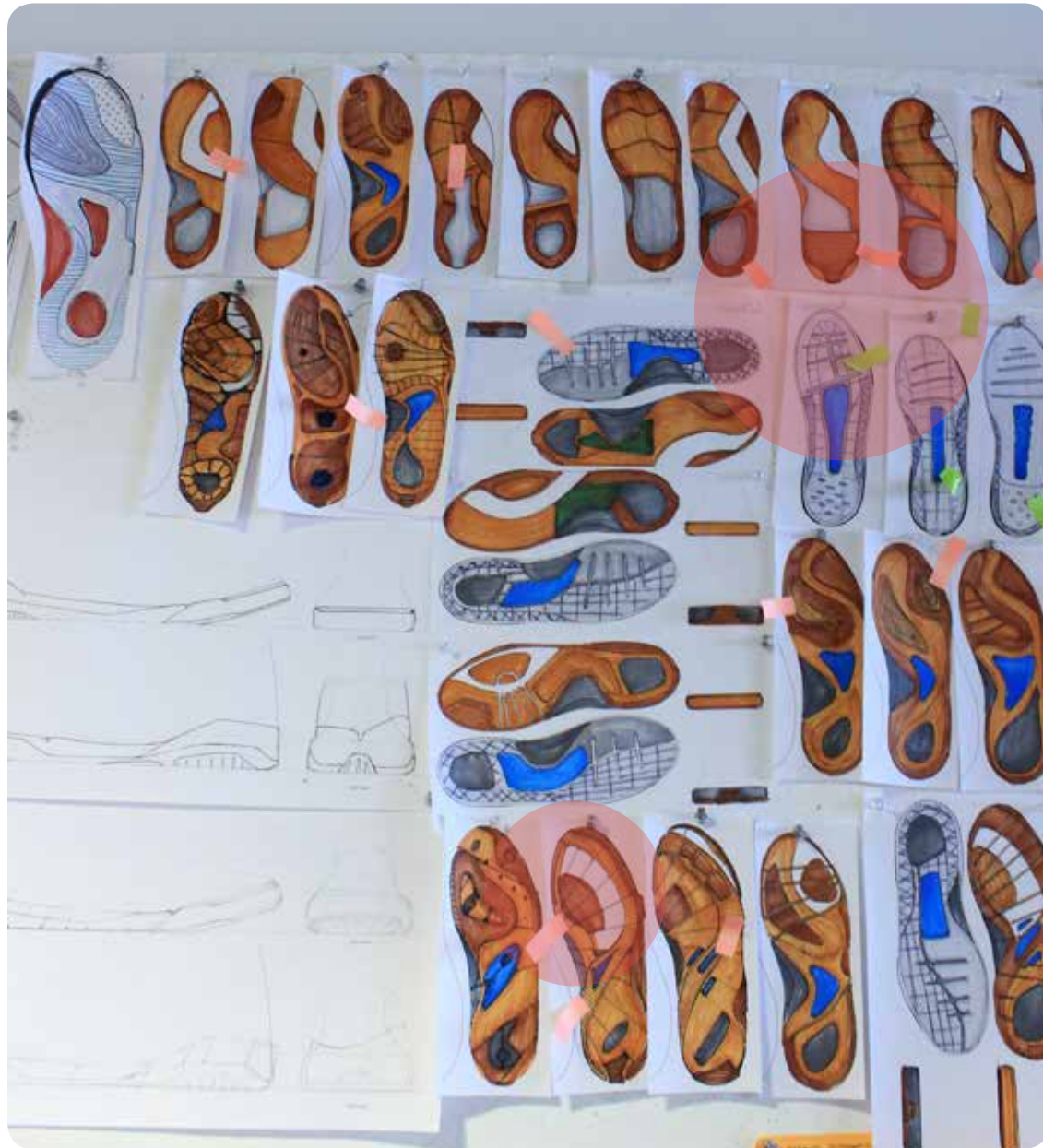
The difference between a shoe without the shank (top), and a shoe with the shank held inside of the shoe (bottom).

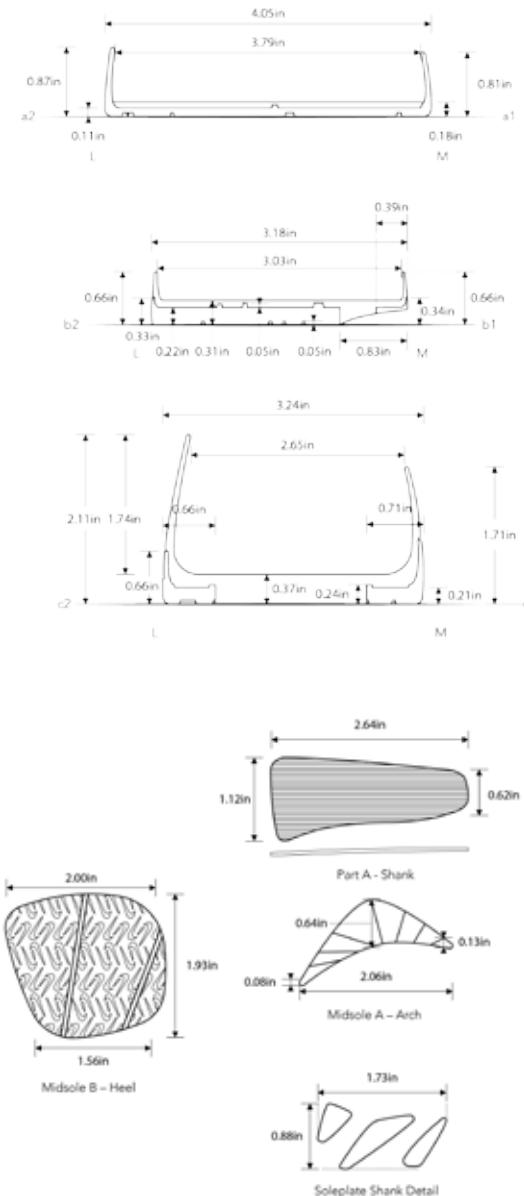
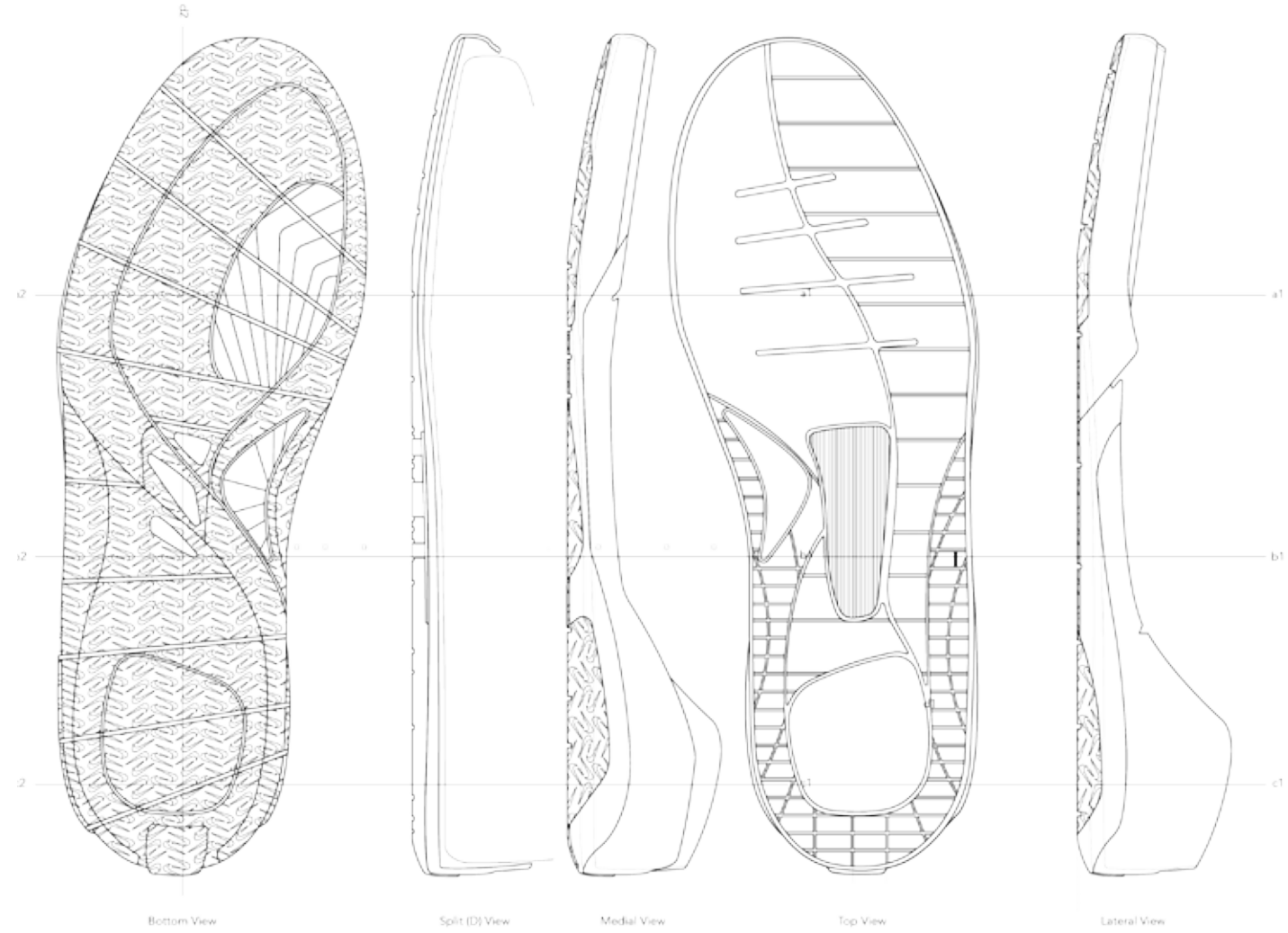
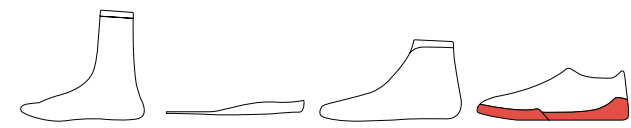
“You have a really nice design lines but that is a result of ergonomics and flex points. The other key would be to celebrate those things.”
 – Nate VanHook, Nike



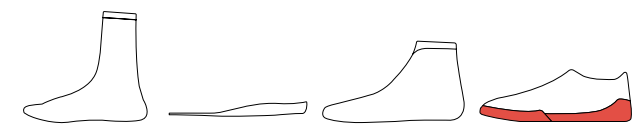
After isolating an ideal shank form, I then brought my research and insights together to develop many iterations of the top and bottom patterns for the outsole. I took sticky-notes and highlighted details that worked for each, and brought these into further iterations.

From these designs, I then began developing mockups and prototypes of the outsole and midsole, starting with clay on a last, moving into 3D printed models, and eventually into an SLS printed model of the final design to confirm the flexibility of the sole in the right places, and to get the detail resolution needed.





I created a complete techpack in order to communicate with the CAD engineers I worked with, and to define scale and proportion for the details I was including. These can be seen in more detail in the appendix of the book.



Flex grooves for lateral and medial Medial arch cup for stability Grip along front sidewall for forefoot impact flicking and lateral stability

These final prototypes helped me to validate and confirm the CAD I had developed, and to help identify adjustments that would need to be made for further iterations. Some of these adjustments would be deeper arch walls, adjusted flex grooves on the sidewall, and thickening the walls of the midsole in the forefoot.

By having the midsole and outsole as two separate density materials, it allows for the ability to colorize them in line with the intended upper material colors. The large full-length midsole becomes a large opportunity for color blocking, while the lower outsole provides for a solid base color, highlighting the grip areas along the bottom of the sidewall.



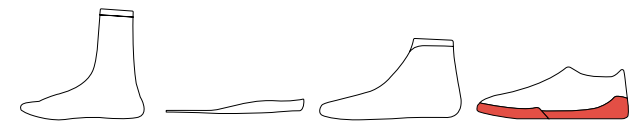
Full-depth midsole in heel and arch

Shimmy-zone smoother texture



Gum rubber grip along medial side

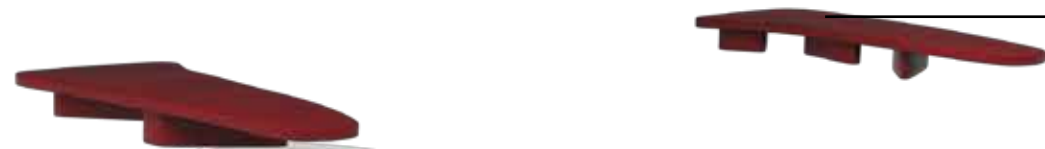
External heel cup



Midsole
Full heel cup support

Thick arch and heel pods
for impact support

Ultralon Ultrastop 260 Speciality Foam



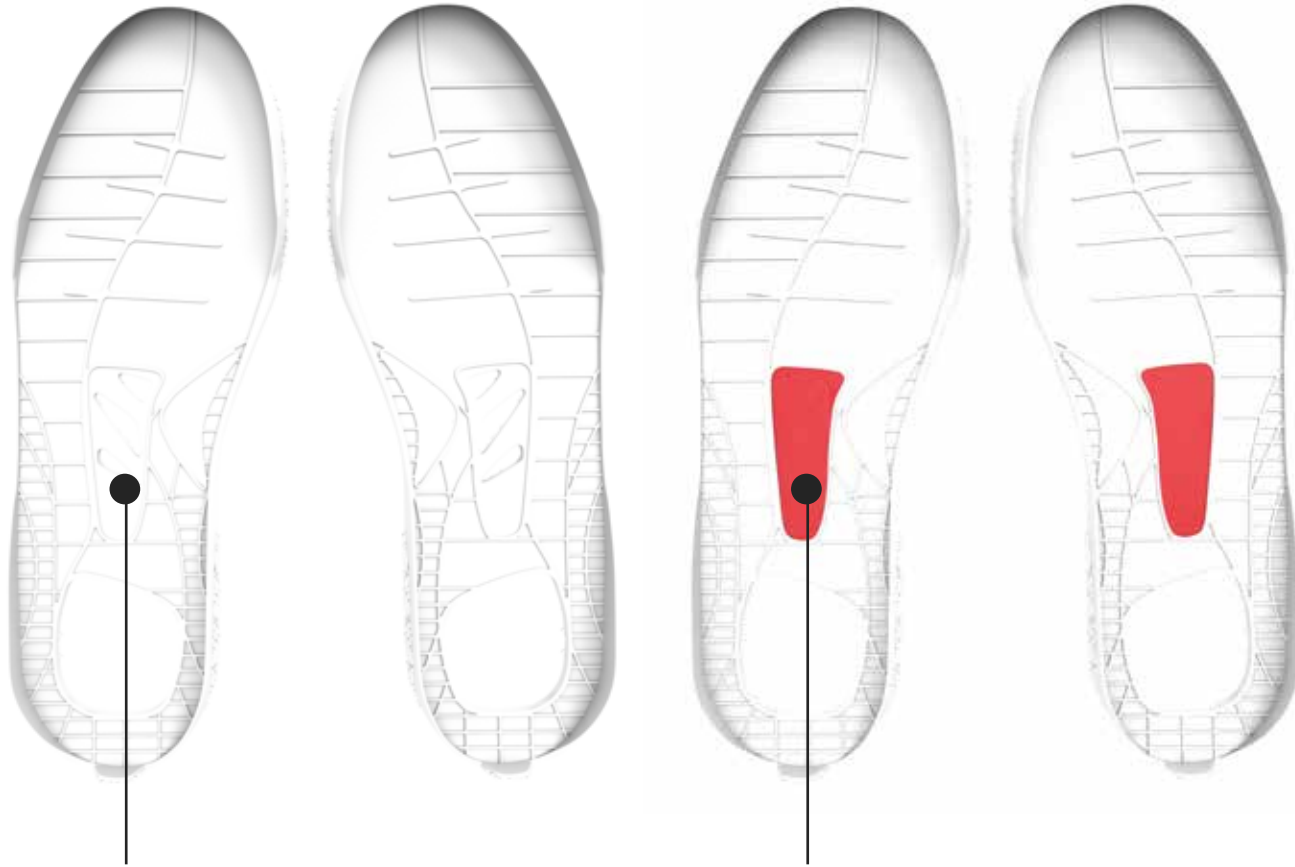
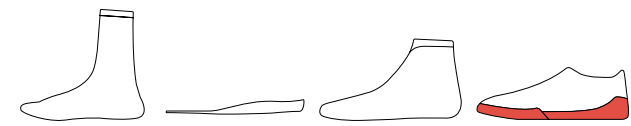
Arch Shank
Stiffer arch support for stability

TPU elastomer



Outsole
Flex-grooves
Custom tread pattern for grip
Deep cup for midsole
Structure grooves for added
midsole adherence

NSB-400 Gum Rubber



Outsole is poured

Arch shanks are inserted into central cavity



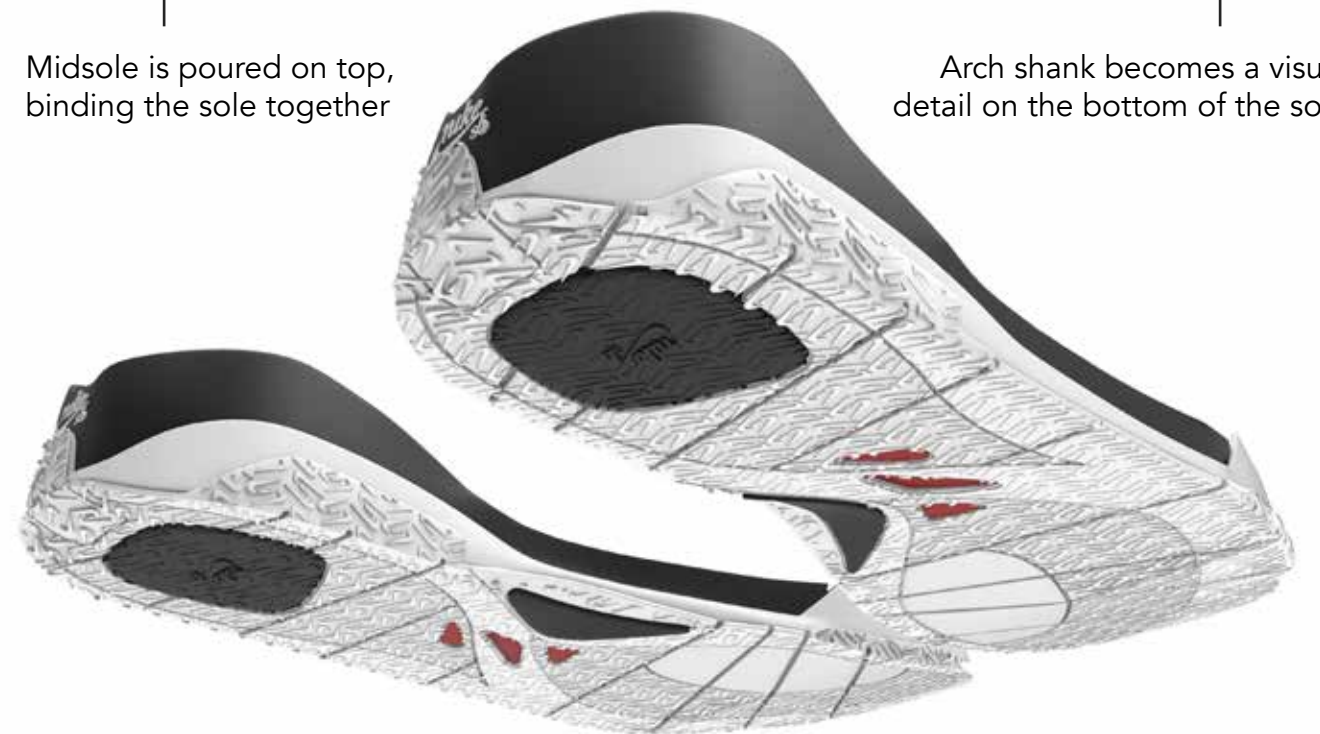
Midsole is poured on top, binding the sole together

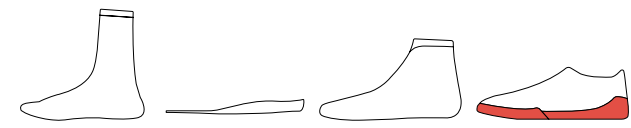
Arch shank becomes a visual detail on the bottom of the sole

Asymmetrical heel cup provides higher support to the lateral side



Gum rubber along heel adds grip and resistance when using foot to slow down





I took my prototypes to Nocturnal skateshop on South St., Philadelphia to hear what they had to say about my project and the concept business model I was proposing.



I researched into the layouts and displays in skateshops to get a better sense of where this product system might live. I decided that ultimately it would be best to display the components on a custom Nike SB fixture, with prepackaged kits at the base and individual components displayed up top.

Secondary Surveying and Feedback

As I developed my product concepts, I reached back out to skateboarders and skate-shops to gain further insight and feedback on what I was proposing not only as features, but how the system would work and be sold as well.



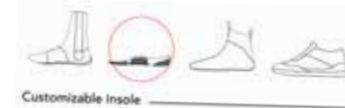
Goal - Develop a product system that you can swap out what you need to replace, and so you can customize the amount of brace support, cushioning, fit, and styling of your footwear through these products. This will help reduce waste, keep skaters healthier and injured less, feel more confident, and more inclined to protect themselves.

I feel that hotter places such as Florida, skateboarders may have a hard time skating these. Our feet get very hot while skating down here, having a sock liner may make your feet get hotter quicker."

"I think you need to think about durability of the sock so maybe having zoned sections of protection as well as maintain durability."



"The insole system needs to be simple and easy to figure out how to make it personalized."



Similar to this OrthoSole product shown, the insole will have swappable pieces that come with it, ranging from soft to hard. This will allow skaters to adjust the comfort, cushioning, and boardfeel that they get, while also providing similar benefit to an Orthotic insole.

The shoe would come with a basic, simple insole, and the customized insole would be a separately sold product offering.

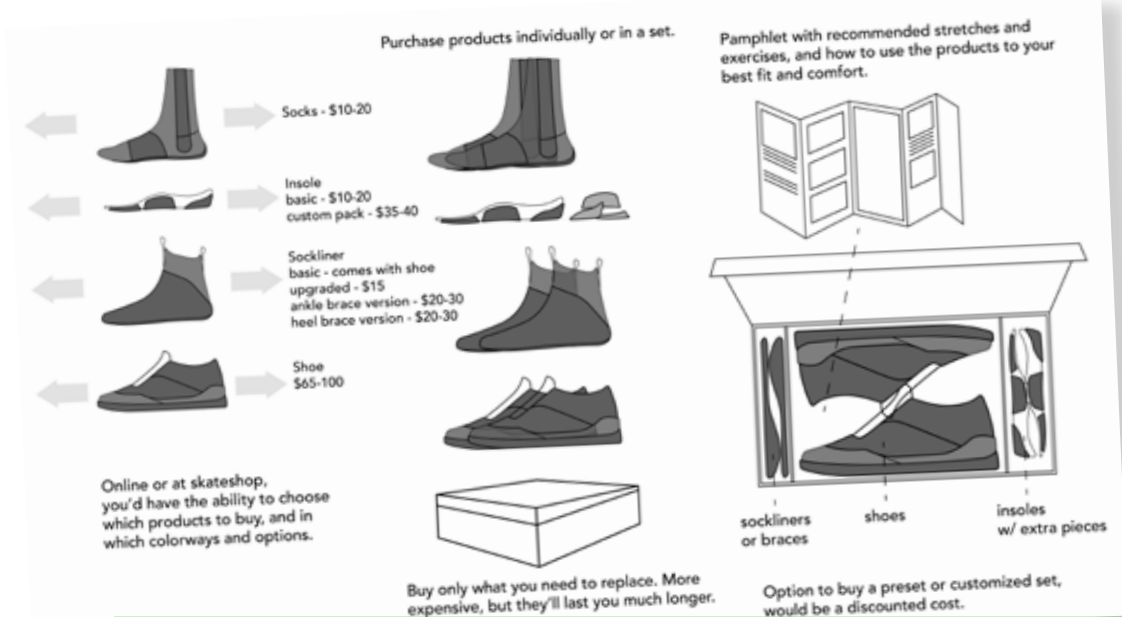


"Every shoe and insole fit is different; the user can't expect to know how it fits before they buy it. Not too many people buy insoles because of this reason."



My concern would be designing the sockliner to be durable enough to make replacing the outer shoe worth it. Specific concern with that is how tall the shoe is to prevent the sockliner from ripping on heel flips and etc."

"Super hyped to see the sock liner. I have trainers with that and it's a game changer."



"Many people at skateshops aren't skaters, but can be a large part of the revenue, especially here in the city. Could they want this too?" - Nocturnal Skateshop, Philadelphia

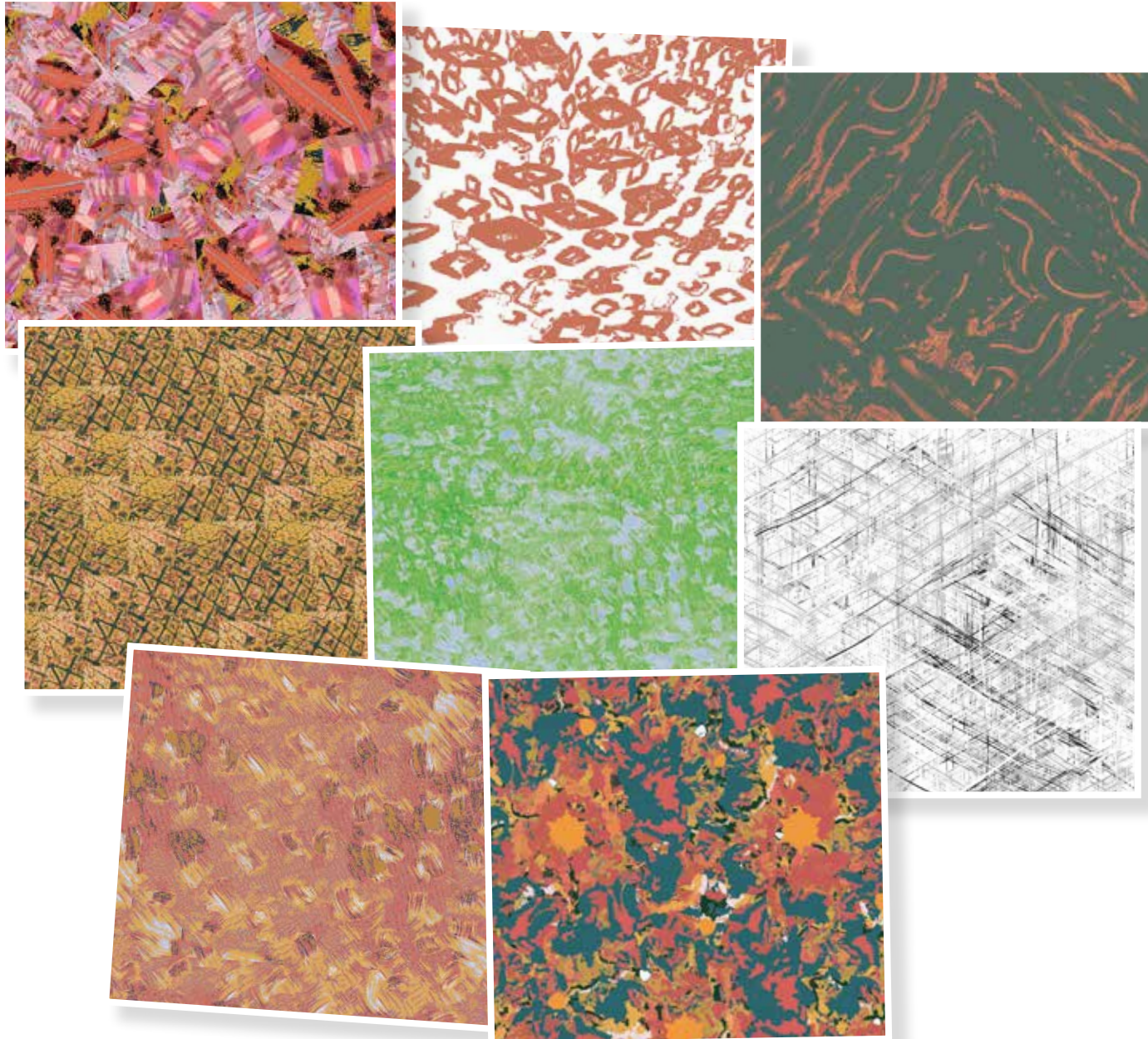
"The pamphlet for suggested wearing and stretching is a nice touch. I'm a huge fan of socks as well so combining all these aspects into one shoe is really cool to me. I'm excited to see where this goes."



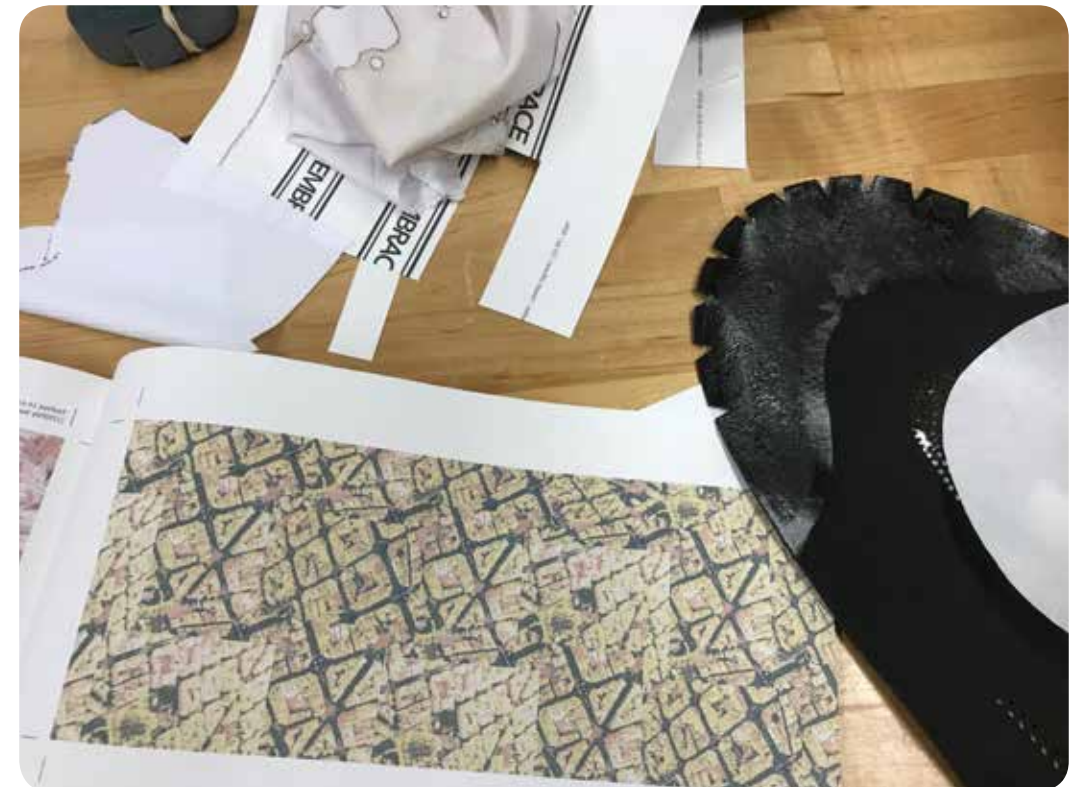
7 Textile Development

Pattern Development

Because I was going to be using an experimental layering construction method (warp knit composites, see pages 212-213) for the upper of the shoe, I took the opportunity to design a set of prints inspired by different cities globally, some being iconic to skateboarding's growth and development, and some that are up-and-coming. These prints would be used across the skate shoes, insoles, and removable brace sockliners, as well as the packaging of the kits.



Cutting out transfer pattern of some of the patterns I would be using.



Die-sublimating the transfer paper patterns onto warp-knit materials.

U.S. East Coast: Philadelphia // D.C. // Boston

East coast skateboarding is iconic for its grittiness – the rough, torn up street spots and legendary plaza skating at Love Park, Freedom Plaza in D.C., and Nashua Street Park in Boston have produced some of the best skaters of the past generations. Often challenged by frozen winters and scorching summers, east coast skateboarders create an interesting blend of style and flow despite the terrain they push over.



#895623 #23351c #847738 #842111 #d8a038

San Francisco

Well-known for its incredible hills, seaside spots and great climate, San Francisco has always been a west coast landmark for skateboarding. Public spots like Embarcadero, 3rd and Army, China Banks have become legendary, and the cities growth through skateparks, companies, and youthful gentrification have made it into what it is today.



#878787 #4fc644 #008e30 #6082d3 #bfcef4

Barcelona, Spain

Not only is it close to the water, good weathered, and welcoming to skaters in most areas, but Barcelona also hosts some of the most beautiful (and skateable) architecture in Europe. Back in the 1990s Barcelona was a skateboarding Mecca, and still is today with spots such as MACBA, Port Forum, and many others around the city, it has become a landmark travel destination for skaters around the world.



#8a5724

#23351c

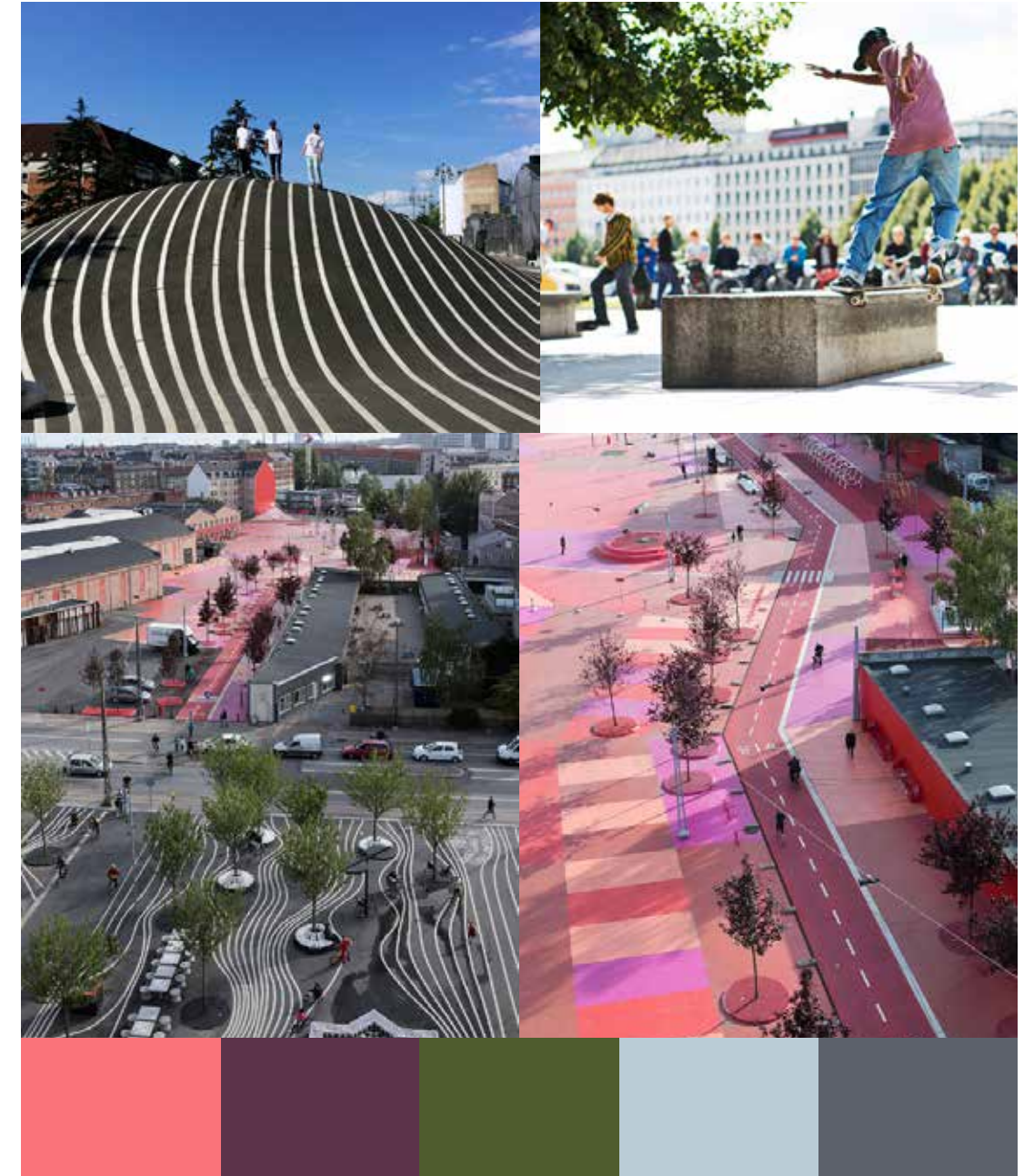
#847738

#852112

#d9a138

Copenhagen, Denmark

Due to a sudden boom in building projects in the past decade, new spots and skateparks are constantly popping up around the Danish city. In relation with the city's rather small size and easy means of transportation, the city continues to make its mark in skate media with spots like Jarmers Plads and Fælledparken and the beautiful city in between. While winters are harsh in Denmark, summers are temperate and with the large acceptance of skateboarding, Copenhagen's growth continues.



#f9727a

#5b3349

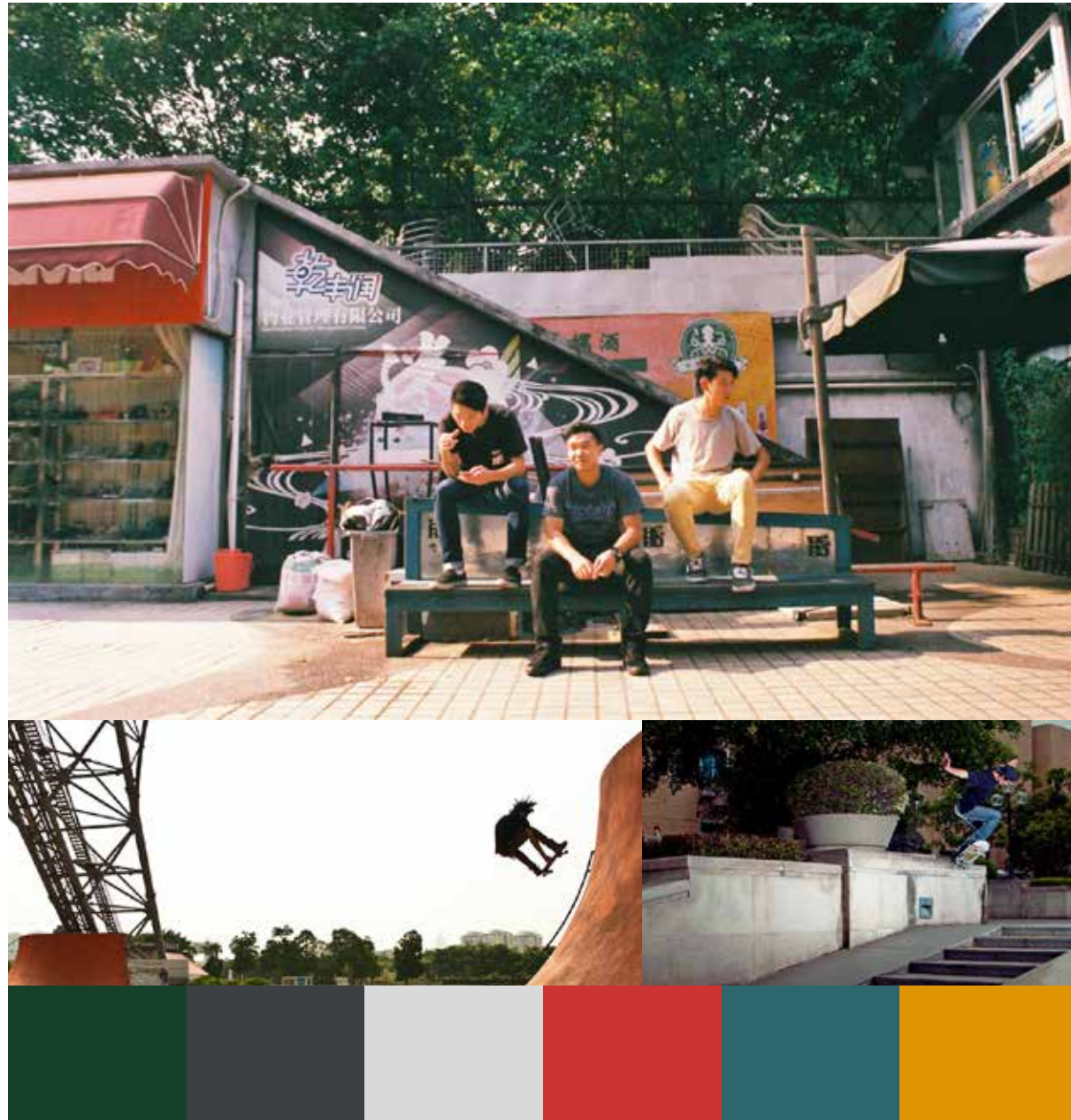
#4f5b2d

#baccd6

#5b606b

Guangzhou, China

Despite the political and social views of its state, Guangzhou skateboarding has been growing over the past few years. While its online access to skate media is limited, touring skate teams, promotion of skateboarding in the Olympics, and an adapting skate culture have put this city on the map. It's incredible architecture in parks like Yuexu Park, leisurely tolerance of skateboarding, and growing community are showing a positive adoption of skateboarding in China.



#163f2b #3d3f42 #d8d8d8 #cc3333 #2d666d #dd9302

Mar Del Plata, Argentina

Even though the city is small, Mar Del Plata in Argentina has a long skate history, great spots and nightlife, which have made Mar del Plata a haven for Argentine skaters. The popularity of spots like Alicante, Pompeya and La Rambla have led to the development of concrete skateparks and visiting skate teams on tour. A great summer climate and cold but desolate winter are leveraged by skaters to help put their city on the map.



#3a383d #285b4c #ddd8cc #f4f4f4 #f29377



Manufacturing Solutions Center
Hickory, North Carolina

In order to take the sock development to the next level, we took a trip down to North Carolina, to the Manufacturing Solutions Center, a textile manufacturing center connected with Catawba Valley Community College.

Here we worked with a team of textile engineers to translate my initial patterns into real prototypes. Seeing their facilities and the process first-hand, as well as walking through the design with textile professionals really helped to carry the design further and into a tangible, producible product.

After receiving the first samples, I gathered some skaters for initial testing to see what we could improve.

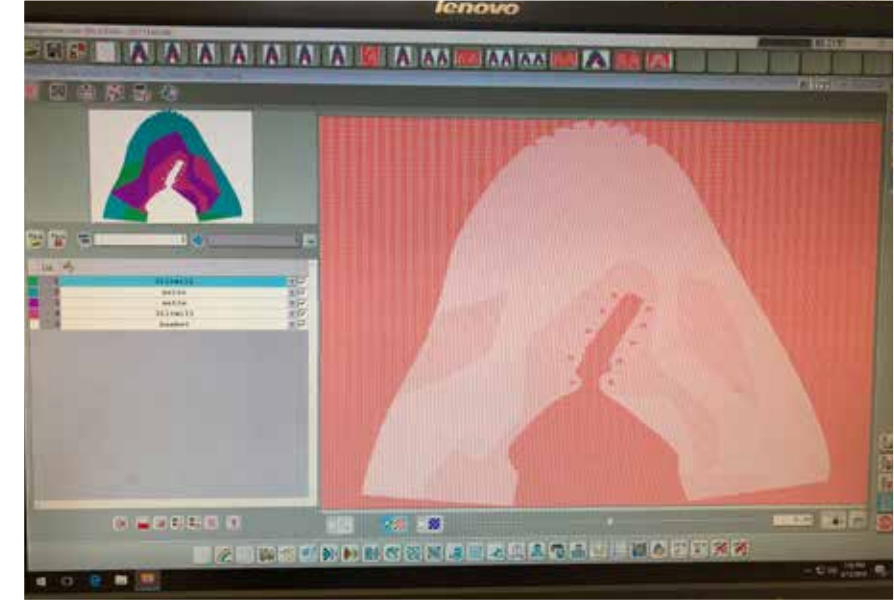


The textile development team for the project, from left to right: Regan Marriner, Jason Wilkins (Innovaknits), Matt Selnick, Rodney Sigmon (MSC), and Mark Sunderland (Jefferson University).

Working with Textile Design Masters student Regan Marriner, we developed a jacquard pattern layer that would go in-between the surface and lining layers of the upper fabric. The different structures within the layer, each having different amounts of stretch and stiffness, would provide asymmetrical performance within the shoe.



Using a low-melt Grilon yarn, just as the removable brace sockliner component does, a simple heating process would be used once the layers are constructed to add stiffness along the lateral toebox and near the arch areas along either side of the foot. To see a more detailed breakdown of the layers, see pages 246-249.





6

Material Research

Sampling Materials

Throughout the course of the project, I contacted many material suppliers to not only test and feel their products, but to gain their insight on the use of their material for my applications. Many of them sent sample books, while others sent out large pieces of material for me to do further testing on. While I was sampling these materials, I was making sure to keep in mind the textile research that I had conducted previously, and to attempt to focus on materials and processes that would reduce the amount of impact on the environment.

The textile industry is incredibly large and encompassing, but with that comes a lot of waste. The statistics below indicate some of the shocking results that we are dealing with because of how global our effort is to deliver standardized and affordable textiles without having good environmental considerations.

80%

of water used by humans goes to livestock production

7 pairs

U.S. consumers buy on average 7 pairs of shoes every year – some of those (~1 pair) are impulse purchases

50%

Only 50% of hides make a successful transition to leather – the rest go to waste



Suede is the most common exterior material used in skate shoes – it's durability, consistent texture, affordability, and large number of offerings make it superior to other materials. However, leather and suede are both typically treated and processed in methods that are harmful to the environment, and a significant amount of waste is produced from the bovine and pig suede process.

18%

of global greenhouse gas emissions come from livestock (55% of anthropogenic nitrous oxide)

The Materials Show

During my visit to The Materials Show in Wilmington, Massachusetts in January, I had the opportunity to meet and explain my project to many companies and industry professionals from companies like Ortholite, Vibram, Faytex, Clarino, and more. I was able to acquire some samples of materials and gain a better understanding hands-on whether or not certain materials would work for my application, validated by the professionals I was discussing with.



Ortholite – Insole



Ortholite's EcoPlush material is a blend of performance foam, and rebled foam offcuts, to create a much more eco-friendly foam material. I decided to propose this material for the insole base because of its great compression, density, and lessened impact.

Ultralon – Midsole / Upper



Ultralon Foams were a great resource to sample materials from for the outsole and midsole. Their wide range of EVA, PE, and EVA/PE Speciality Foam blends were high performing. I proposed using their Ultralon Ultrastop 260 foam for the midsole of the shoe's sole.

MatPlus – Upper



Derek Wilson of MatPlus provided me with material samples to test with of their materials, including their synthetic suedes and leathers. Through getting to test their materials, I learned that their synthetic leather material held up better to abrasion resistance testing than any other material I tested.

Cosmo Fabrics – Strobel



Cosmo Fabrics is one of the largest global footwear material suppliers, and provided me with many samples of sandwich mesh, knit fabrics, and other materials such as foam composites, fusibles, and strobel materials, all intended for footwear. They sell a 40% recycled strobel material which I proposed instead of a conventional strobel.



As I was developing the socks and removable braces for my system, I wanted to integrate a higher performance yarn into the knit material so that it would have additional benefits beyond the integrated structure. I got in contact with Nathan Norley at Hologenix, LLC., who gave me his thoughts on my concept system and suggested using their material in a 40% blend. He provided sample materials and information for me to use to better understand the product and what it could do for skateboarders.

HOW It Works

- Celliant's proprietary mix of 13 thermo-reactive minerals is embedded into the core of polyester fibers during the extrusion process.
- These embedded minerals give any product developed with Celliant the ability to absorb and re-emit the visible and infrared electromagnetic light energy emitted by the body.
- These minerals then alter the wavelengths of this energy and reflect them back to the body, even through multiple layers of fabrics, making it possible for the tissue to absorb it.
- The energy that Celliant recycles back to the body triggers vasodilation in the capillary bed and makes more oxygen available to your cells. This results in more fuel for your body.
- This natural, biological process improves circulation resulting in an average increase in tissue oxygenation of 7%. The result: your body uses oxygen more efficiently.

BENEFITS

Celliant technology is clinically proven to enhance tissue oxygen levels, improve athletic performance, increase sleep quality, and enhance your overall quality of life.

BALANCE



























PERFORMANCE

RECOVERY

COMFORT

WELLNESS

The FDA has determined that Celliant products are medical devices as defined in section 201(h) of the Federal Food, Drug and Cosmetic Act and are general wellness products

Material Testing – Taber H18					
Material	Original	1300 cycles	2150 cycles	2250 cycles	Conclusion
Pig Suede 1.4mm					Material wore through slightly and lost its grippy texture. Material would be acceptable for the application, but sourcing and use is not eco-friendly enough.
SuperFabric 700180-900 .8mm					Material wore through significantly, ending in holes and significant fiber dust. Material is not best suited for this application.
SuperFabric 700538-700 .5mm					Material wore down and became very smooth compared to original bump texture. Material is not best suited for this application.
SuperFabric 600-100-960 1mm					Material wore down and became very smooth compared to original bump texture. Material is not best suited for this application.
MatPlus Synthetic Suede .6mm					Material wore through significantly, ripping through the surface of the material far earlier than other materials even gained much wear. Material is not best suited for this application.
MatPlus Synthetic Leather 1mm					Material did not wear through much, and the surface texture stayed pretty similar. Material did not show signs of distortion or much wear. Material is well-suited for this application.
Clarino Synthetic Suede 1.2mm					Material wore down and became very smooth compared to original bump texture. Material is not best suited for this application.

I conducted material testing on a Taber machine using H-18 discs to compare against Taber test results I had received from material suppliers. I worked with Janet Brady and our other resources in the Grundy Lab to run the material testing, which helped me conclude that a synthetic leather had a great combination of abrasion-resistance, consistent texture, and more eco-friendly manufacturing.



I sourced TPU film and began testing how well and with what techniques it would adhere to the list of materials that I was considering.

I did the most real test of materials for skateboarding footwear possible – rubbing them on griptape. This gave me a more real sense of not only how much the texture of the material would change, but also how the material would rub and fray.



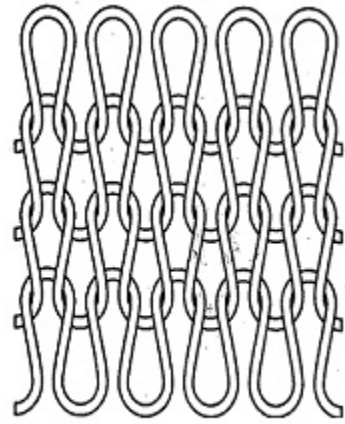
Because I wanted to use an emboss in the upper material to help reduce the chance of wear along the eyestay, I tested how well each material would press using 3D-printed molds and different glue combinations.

“The leather of the textile industry”

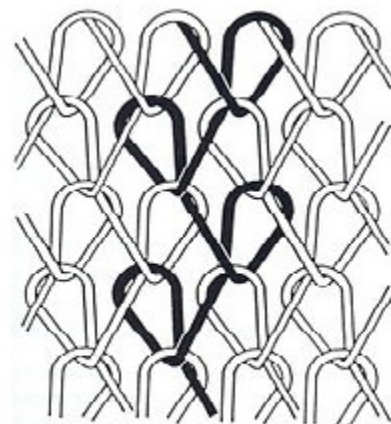
Woven fabrics are made from threads running vertically and horizontally, which leaves little room for variation in porosity and almost no room for stretch. This means that they lack the ability to fit and move with the foot.

“Warp knitting is the linking of stitches and loops and frees designers to vary the fabric’s architecture in ways that affect elasticity, porosity, durability, coarseness or smoothness. Warp knitting allows for the production of much wider sheets of fabric than circular knitting or weaving. It creates fabrics much less likely to sag, shrink or ravel. And, warp knitting allows for the creation of three different kinds of fabric: solid knit, mesh/netting and 3D spacer fabrics.”

- Apex Mills



Weft Knitting



Warp Knitting



“It’s artisinally automated – you can do it at the office or in the factory.” – Mark Sunderland



Warp-knits offer a whole new way of looking at the textile composition of a product – most footwear fabrics are selected out of a foreign sample book and call it a day. How often are you able to customize the stretch, durability, print, and breathability of a fabric throughout the pattern? The amount of influence that can have on the end product is huge, especially in the industry today. Typically used for aerospace, automotive, furniture, medical, filters, or other products, warp-knits bring a new element to typical footwear construction. The scraps and waste from these industries can be taken and used for footwear, allowing for the material to find a secondary purpose, just like in the typical leather industry.

“Die sublimation fosters a blend in process from traditional to experimental.”
– Mark Sunderland, Textile Engineer





8 Final Proposal

Why *nike* sb?

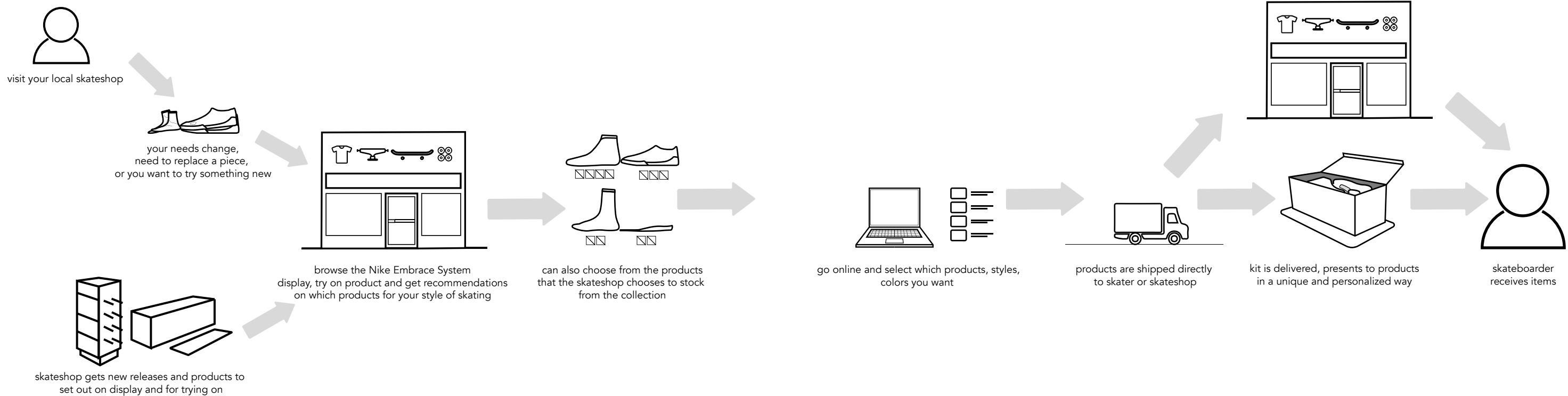
Nike is a large industry player that needs to expand its influence in skateboarding beyond its classic silhouettes and addition of great skaters onto its team.

Nike has always been known for pushing the boundaries of performance, through not only material and technology innovation, but as a company through initiatives.

Nike already sells and endorses a high level of protective products and accessories for other sports, but has yet to do so for skateboarding.

Skateboarders have always questioned the authenticity of large corporations like Nike, and the Embrace System would prove that Nike is trying to do more for the shops, skaters, and culture. Nike currently offers NikeiD as a method of customization, but a modular footwear concept is the next step that needs to be taken to push customization farther.

As a company that has pushed the boundaries in the past, skateboarders will need to see this same impact in their efforts to positively grow skateboarding in order to feel respected and inspired.













Benefits for the skateshop:

- NikeSB provided floor display
- Skateshop gets the same cut that they would get from shelf inventory
- Saves from sunk cost on otherwise unsold inventory
- Promotes coming into the skateshop to get new or replacement pieces
- Collaborations and new releases can be promoted through in-store display

Benefits for the skater:

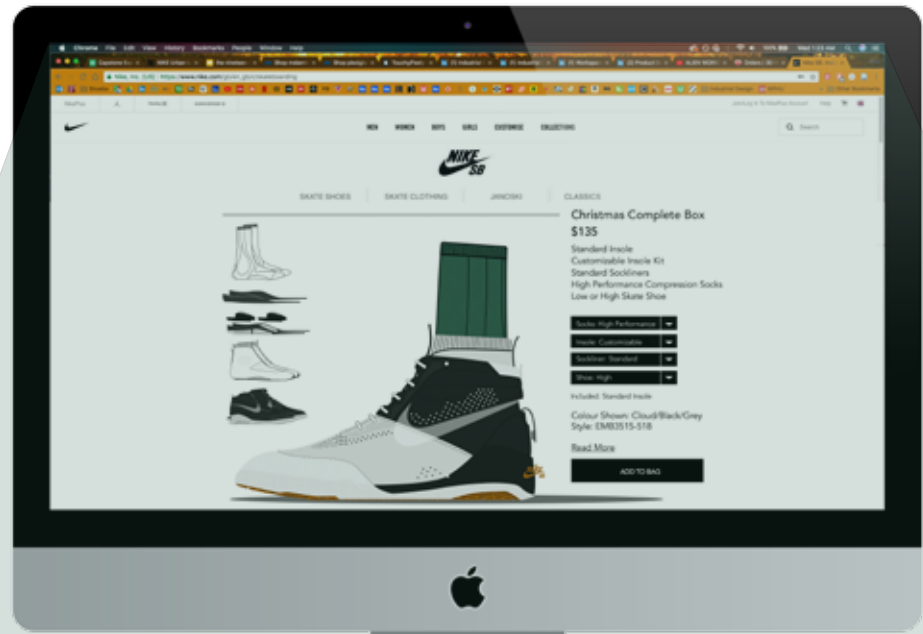
- Makes it easy to upgrade and replace as you go
- Promotes more collaboration and offerings specific to skater's needs
- Better performance and protective gear that skater's are more open to wearing
- More incentive to visit skateshop for gear and to support the shop

System Breakdown – SKU Offerings

 <p>\$10 Performance Socks – comparable to Stance socks – graphic patterns, light cushion and muscle assistance</p>	 <p>\$15 Basic Sockliner – Low-cut – summer months – low-cut preference</p>	 <p>Free / \$5 Standard Insole – solid cushioning and support – comes with basic shoe kit</p>	 <p>\$65-80 Low or Mid-top Skate Shoe – ankle support – composite construction – heel support</p>
 <p>\$15-20 High Performance Socks – compression – graphic patterns, denser cushion – muscle assistance – Celliant Fiber</p>	 <p>\$15 Basic Sockliner – Standard – comes with the shoe – breathability, light support under arch</p>	 <p>\$25-35 Customizable Insole – solid cushioning and support – comes with basic shoe kit</p>	 <p>\$70-80 High Skate Shoe – higher ankle support – composite construction – heel support</p>
 <p>\$20-30 Heel Brace Sockliner – Individual sold separately – post heel bruise or injury – instep and arch support – compression and elastic wrap</p>			
 <p>\$20-30 Ankle Brace Sockliner – Individual sold separately – post ankle sprain or tweak – side-wraps and padding – light compression and arch support – tighten in back of foot</p>			

Each product is offered in multiple colorways and print designs.

The overall offerings for the Embrace system and their retail price points.




Christmas Complete Box \$135

Standard Insole
 Customizable Insole Kit
 Standard Sockliners
 High Performance Compression Socks
 Low or High Skate Shoe

Included: Standard Insole












Colour Shown: Cloud/Black/Grey
 Style: EMB3515-518

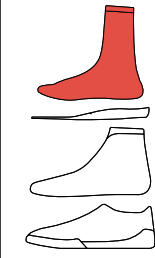
[Read More](#)



The system would be accessible to purchase and customize your kit from online.

Embrace Yourself.
Embrace System Retail Options

	Softy's Box						Standard Kit		Christmas Complete Box		
Components Included	Basic Sockliners – Low Basic Sockliners – Standard	Performance Socks Basic Sockliner	HighPerf. Socks Performance Socks Basic Sockliners	Ankle Brace Sockliner (L/R) Heel Brace Sockliner (L/R)	HighPerf. Socks Custom Insole Pack	Performance Socks Ankle Brace Sockliner Heel Brace Sockliner	Basic Sockliners Standard Insole Low/High Skate Shoe	Standard Insole Ankle Brace Sockliner (L/R) Heel Brace Sockliner (L/R)	Customizable Insole Pack Low/High Skate Shoe	HighPerf. Socks Standard Insole Custom Insole Pack Low/High Skate Shoe	HighPerf. Socks Ankle Brace Sockliners Custom Insole Pack Low/High Skate Shoe
Benefits	Customization Ready for warm and cold weather	Cheaper way to get a new appearance	Kit discount Most customized support Ankle support Prevention	Protection Ankle Support Heel Support Prevention Kit Discount	Kit discount Customized support Ankle support Customization	Protection Will be prepared for injury when it occurs	Everything you need to get going	Protection Ankle Support Heel Support Prevention Kit Discount	Customization Kit Discount Replacing / Upgrading	Kit discount Customized support Ankle support	Kit discount Most customized support Ankle support Prevention
Suggested User	Everyone	Core skater Teenagers Young Adults	Older adults (35+) Young adults (22-34)	Young Adults (22-34) Older Adults (35+)	Older adults (35+) Young adults (22-34) Teenagers	Everyone	Parents (children 6+) Older adults (35+) Young adults (22-34)	Young Adults (22-34) Older Adults (35+)	Young Adults (22-34) Older Adults (35+)	Older adults (35+) Young adults (22-34)	Older adults (35+) Young adults (22-34)
MSRP Price	\$30	\$30	\$50	\$55	\$60	\$65-70	\$120	\$135	\$145	\$195	\$210
Individual Pricing	 \$15	 \$25	 \$15 (when purchased separate) Included with skate shoe	 \$15 (when purchased separate) Included with skate shoe	 \$25 - 30 Sold individually (choose right / left)	 \$25 - 30 Sold individually (choose right / left)	 \$35 Customizable Insole Pack	 \$5 (when purchased separate) Included with skate shoe	 \$120 Without sockliner or insoles	 \$120 Without sockliner or insoles	 \$120 Without sockliner or insoles

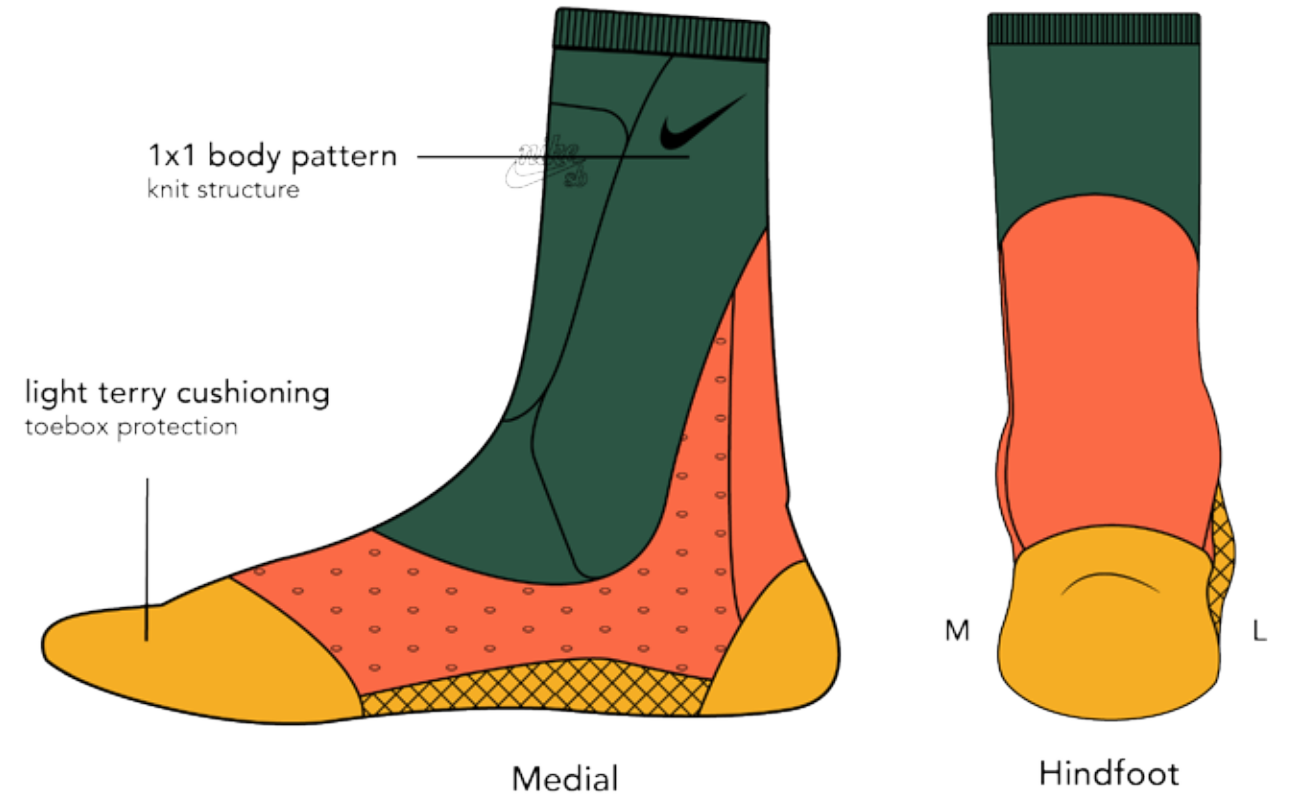
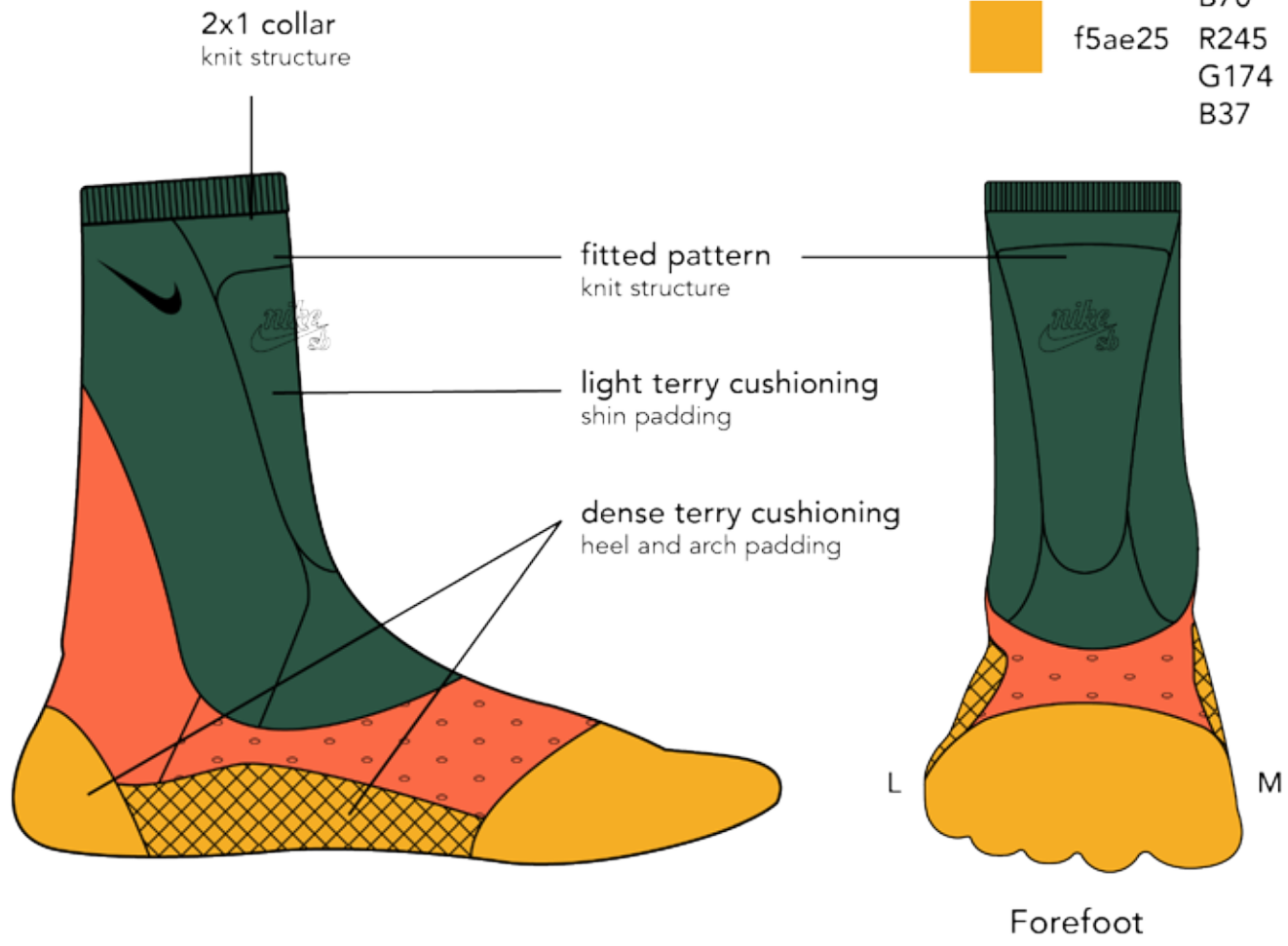


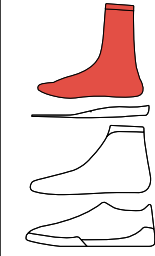
Performance Sock

Sock designed to compete with typical performance socks, designed specific for skateboarders.

Men's/Women's	Colorway: N/A	
Sock	5/5/18	Scale N/A

- 2c5544 R44
G85
B68
- fb6a46 R251
G106
B70
- f5ae25 R245
G174
B37





High Performance Sock

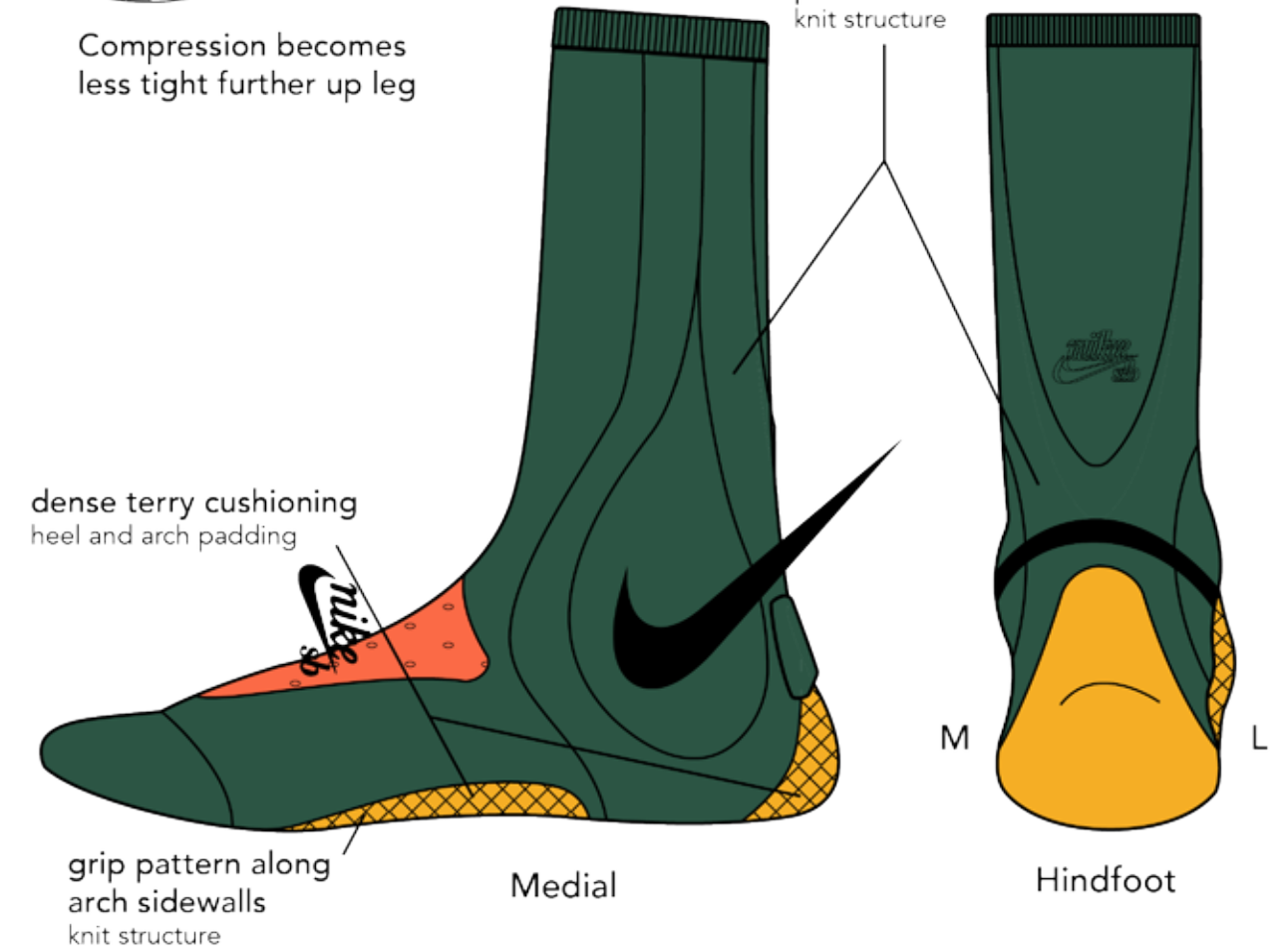
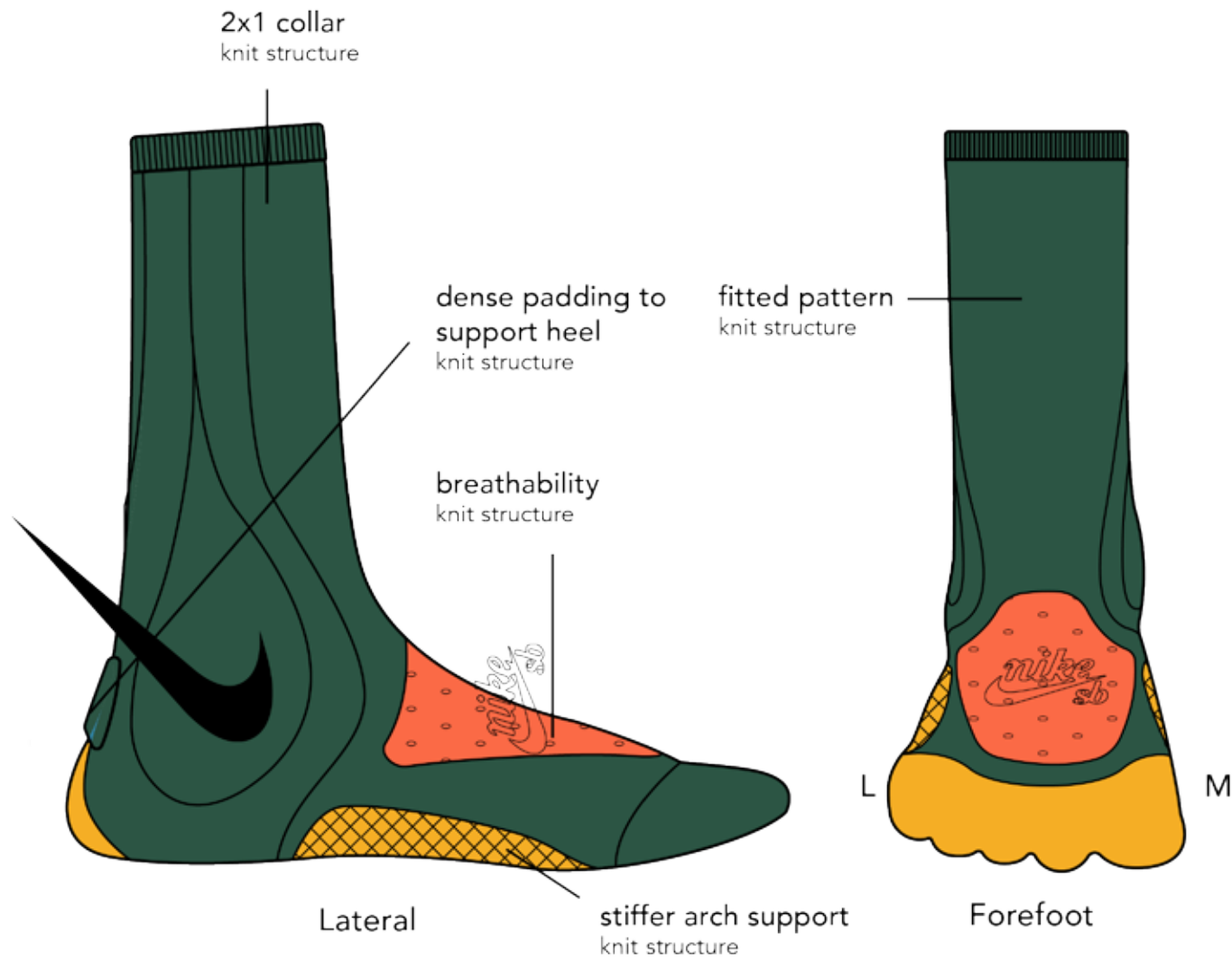
Compression sock intended to provide additional support to skateboarders during and after the session.

Men's/Women's	Colorway: N/A	
Sock	5/5/18	Scale N/A



Compression becomes less tight further up leg

helix compression pattern knit structure



Performance Sock Yarn Info.		
Yarns used to produce the sock with moisture-wicking and other performance properties.		
Men's/Women's	Colorway: N/A	
Sock	5/5/18	Scale N/A

Antimicrobial Yarns for Odor Control by Unifi

A.M.Y.

Sometimes less is more.
Less bacteria mean less odor. Amazing technology embedded in A.M.Y. permanently inhibits the growth of odor causing bacteria on your clothes. Less bacteria and odor, more freshness and comfort.

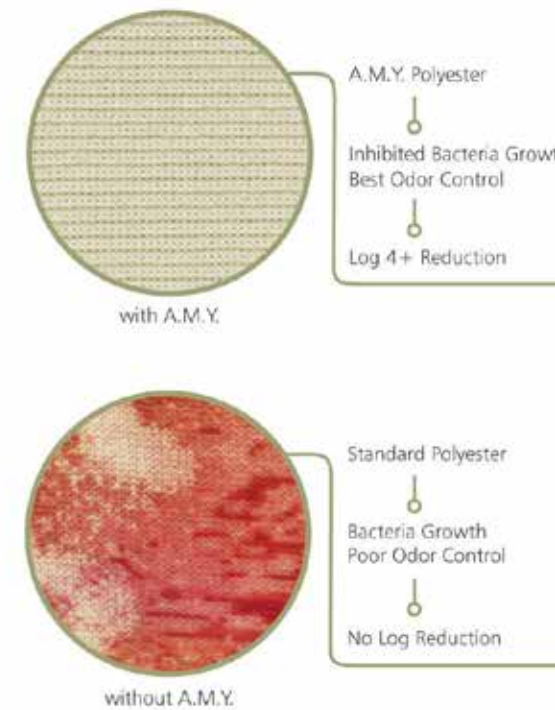
product benefits

- Inhibits the growth of odor causing bacteria, mold, mildew & algae on fabrics
- Permanent odor control technology
- Non-migratory
- Extends garment life; less discoloration & degradation
- Environmentally safe
- Design flexibility; can be engineered into garments
- Available in fine microdeniers
- Can be combined with other performance features; available as aio*, all-in-one performance yarns

UNIFI
www.unifi.com

* This product does not protect the wearer from disease-causing bacteria. Printed on recycled paper.

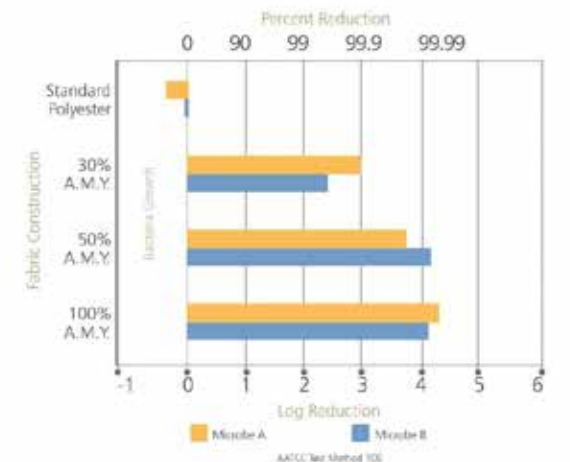
Visual Indicator of Odor Control



TTC Agar Assay Test Method

- * "Plate Contact Method" samples tested against bacteria Microbe A
- * Microbe A that survive grow between sample and agar to produce red colonies

Odor Control Comparison



helpful hints

fabric content, construction, dyeing and finishing influences odor control properties.

- Log 1 Reduction = Good Odor Control
- Log 2 Reduction = Better Odor Control
- Log 3+ Reduction = Best Odor Control

A.M.Y.

- For fabric construction recommendations and dyeing and finishing guidelines, please refer to the Unifi Code of Best Practices.
- For fabric certification and branding support, all products must undergo testing to ensure fabric quality and integrity.
- For additional information, please contact your Unifi representative or email us at marketing@unifi.com.

Performance Sock Yarn Info.		
Yarns used to produce the sock with moisture-wicking and other performance properties.		
Men's/Women's	Colorway: N/A	
Sock	5/5/18	Scale N/A

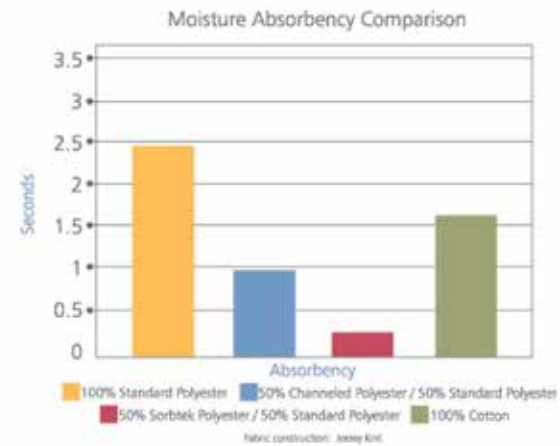
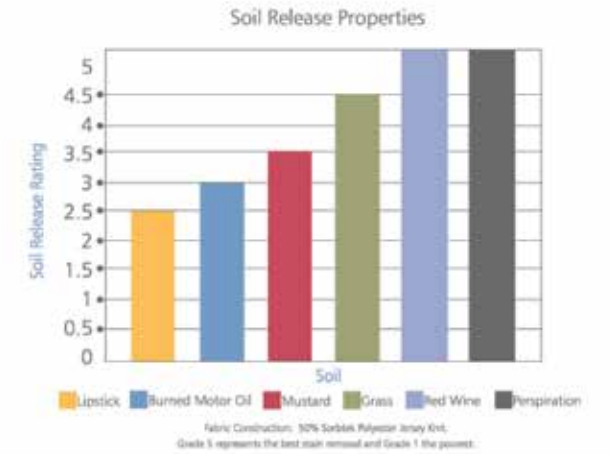
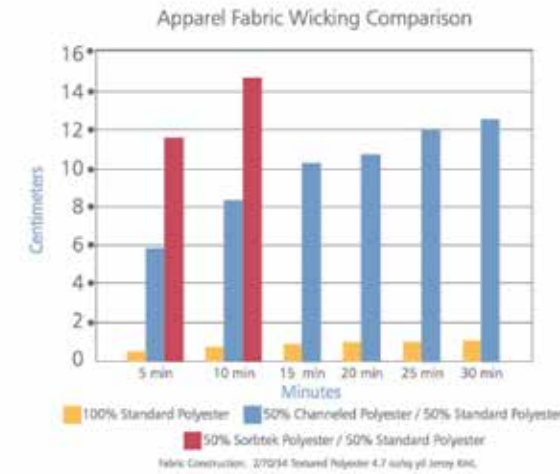
Moisture Management Yarns by Unifi

When you get going, Sorbtek goes to work. An incredibly efficient catch, move, release system keeps you cool, dry and comfortable. It's a permanent part of the fabric. So go ahead, get going. You've got Sorbtek.

product benefits

- Permanent Moisture Management
 - Breathable; quickly leaves wearer cool, dry & comfortable
 - Durable through at least 50 home launderings
- Catch, Move, Release Nano-Technology
 - Catches moisture, moves it away & releases it for quick evaporation
 - Sorbtek moves moisture 4X faster than channeled polyester fabrics
- Inherent Stain Release Properties
 - Added protection against every day stains such as sweat & grass
- Can be combined with other performance features; available as aio™, all-in-one performance yarns

www.unifi.com



Sorbtek

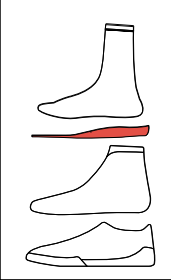
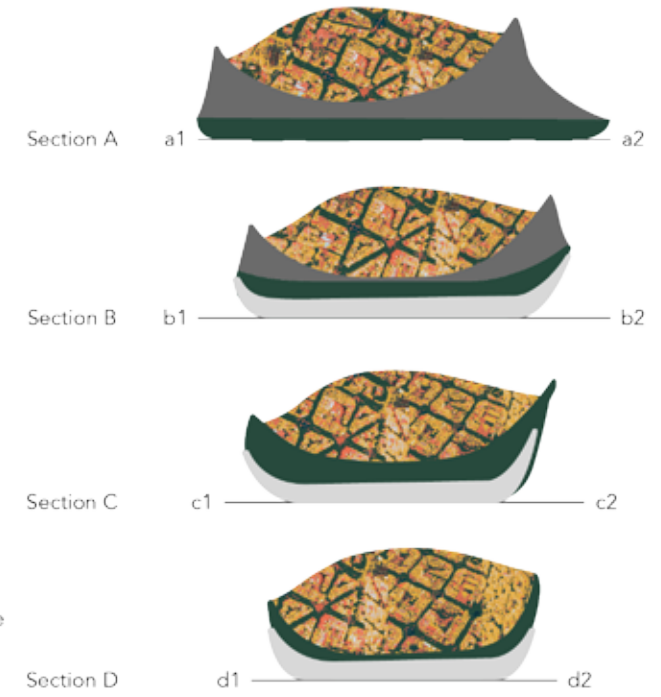
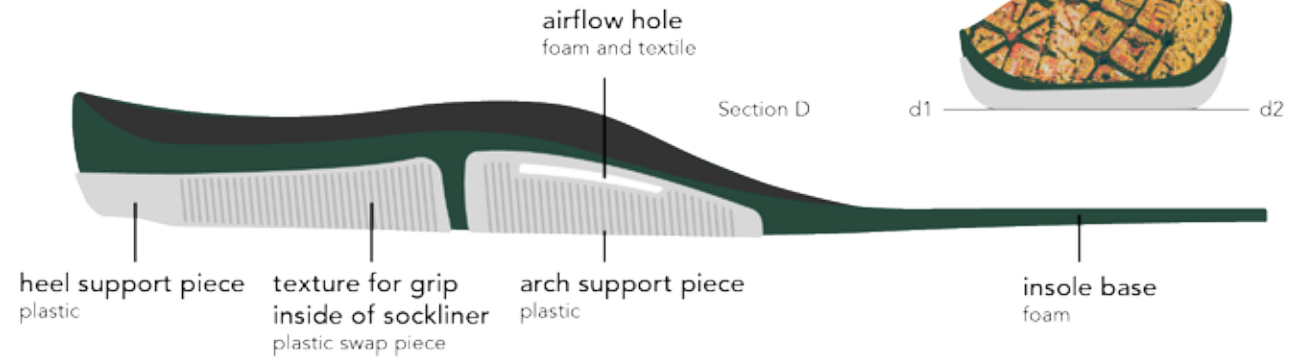
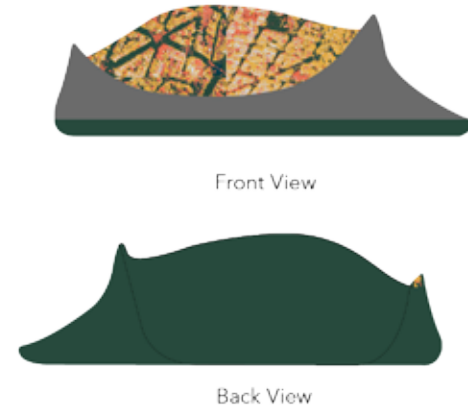
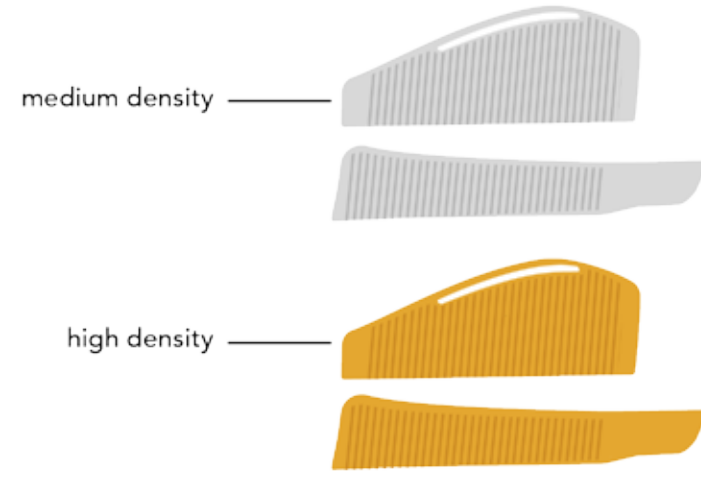
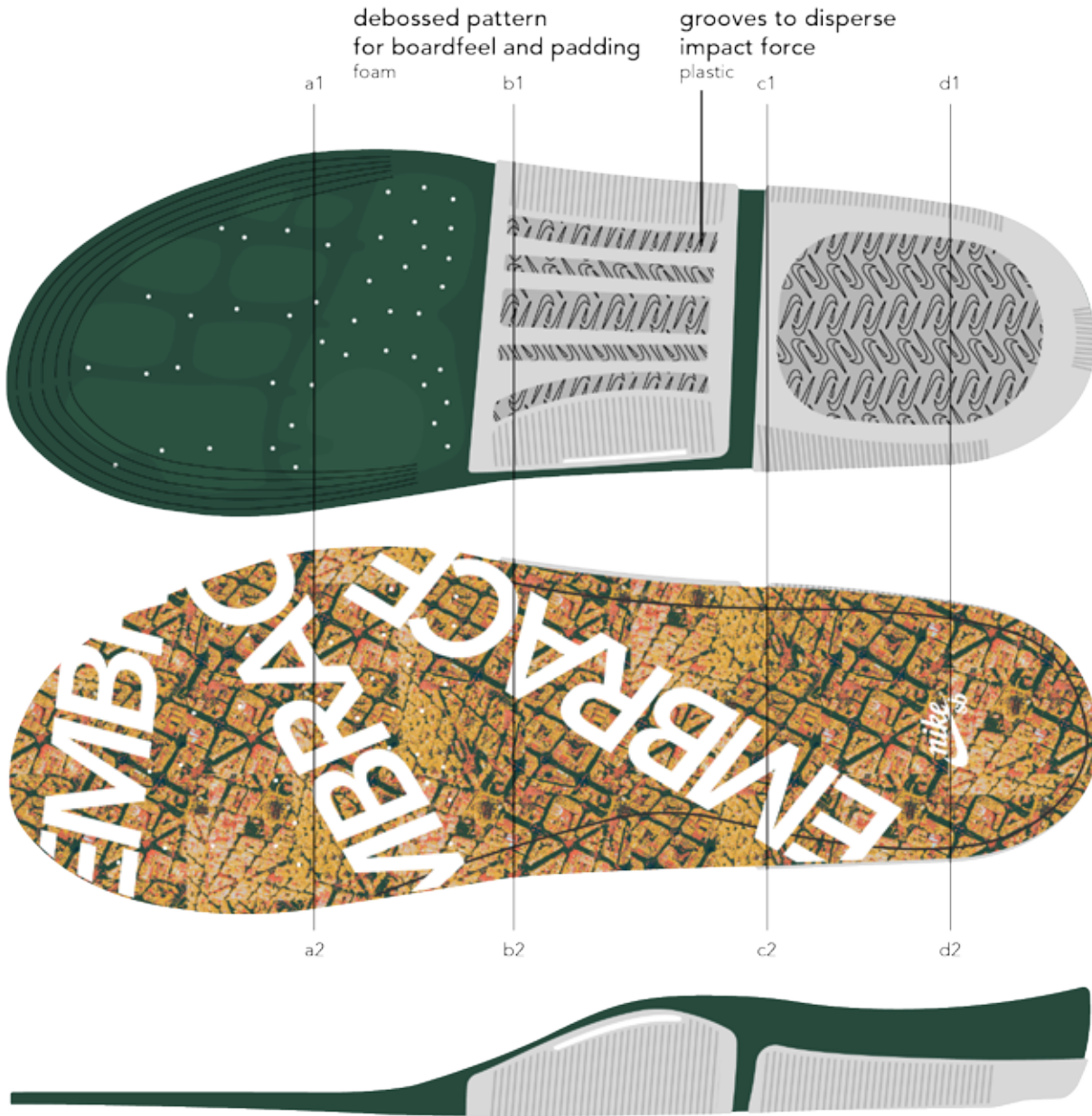
helpful hints

- Fabric content, construction, dyeing and finishing influences moisture management properties.
- Determination of wicking: PTL 1240
 - standard-15cm < 30 minutes after 3 launderings
- Determination of absorbency: AATCC Test Method 79
- Determination of soil release: AATCC Test Method 130

• For fabric construction recommendations and dyeing and finishing guidelines, please refer to the Unifi Code of Best Practices.

• For fabric certification and branding support, all products must undergo testing to ensure fabric quality and integrity.

• For additional information, please contact your Unifi representative or email us at marketing@unifi.com.



Modular Insole

Insole designed to allow for skater's to customize their heel cushioning and arch support.

Men's/Women's	Colorway: N/A	
Insole	5/5/18	Scale N/A



How do you prefer to skate?

Swap the pieces to maximize your comfort.

Inside the package, you'll find 8 support pieces:

- (2) left heel supports
- (2) left arch supports
- (2) right heel supports
- (2) right arch supports



The gray pieces are the "standard" amount of cushioning and support.

The yellow pieces are for the additional, stiffer arch support or the softer, extra cushioning your heels may need.

Test out the combinations, see what feels best, and enjoy!

Standard Setup

feel the board, but not sore feet.



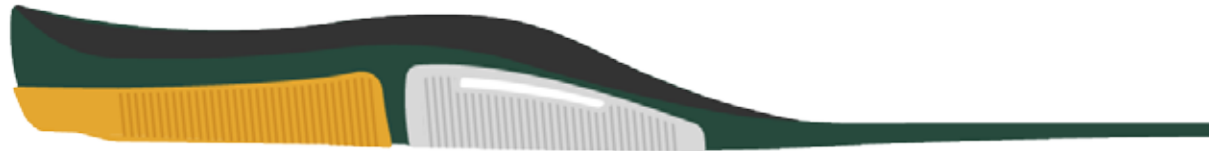
Additional Arch Support

no primo-bruises or arch pain here.



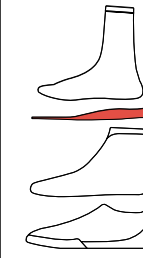
Additional Heel Support

for jumping down stairsets, gaps, you name it.



Maximum Cushioning and Support

tackle any obstacle with confidence.



Insole Directions

Directions placed inside of insole kit package, used to indicate how to use the insole system.

Men's/Women's	Colorway: N/A	
Insole	5/5/18	Scale N/A

Everyone's feet are different, and your own two feet may be different too.

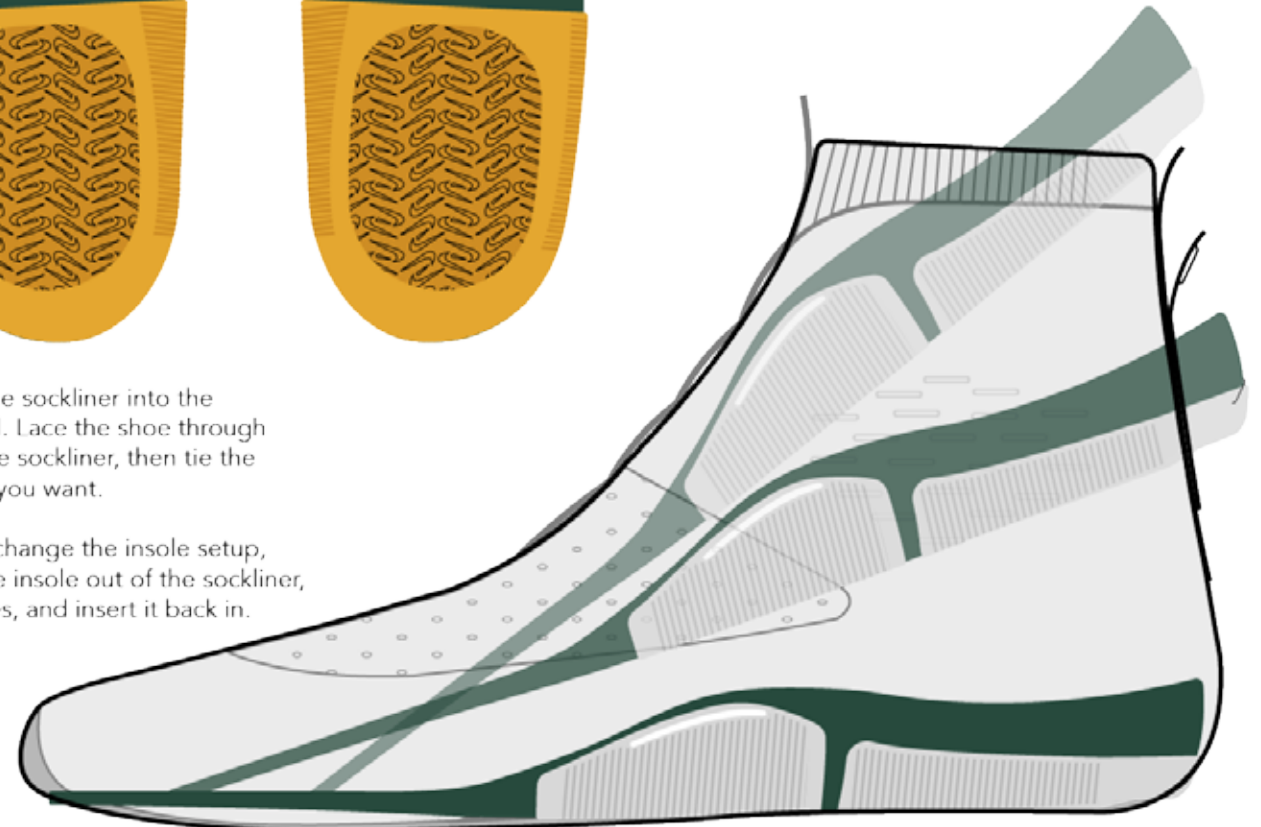
The Nike Embrace Insole Kit allows you to customize your preference and maximize your comfort for each foot.

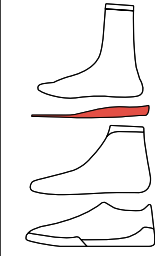
Once you've fit the pieces to your preference, simply insert the correct side insole into the matching sockliner, and make sure it sits flush against the bottom foam.



Then, attach the sockliner into the shoe as normal. Lace the shoe through the loops of the sockliner, then tie the shoe to the fit you want.

If you want to change the insole setup, simply slide the insole out of the sockliner, swap the pieces, and insert it back in.

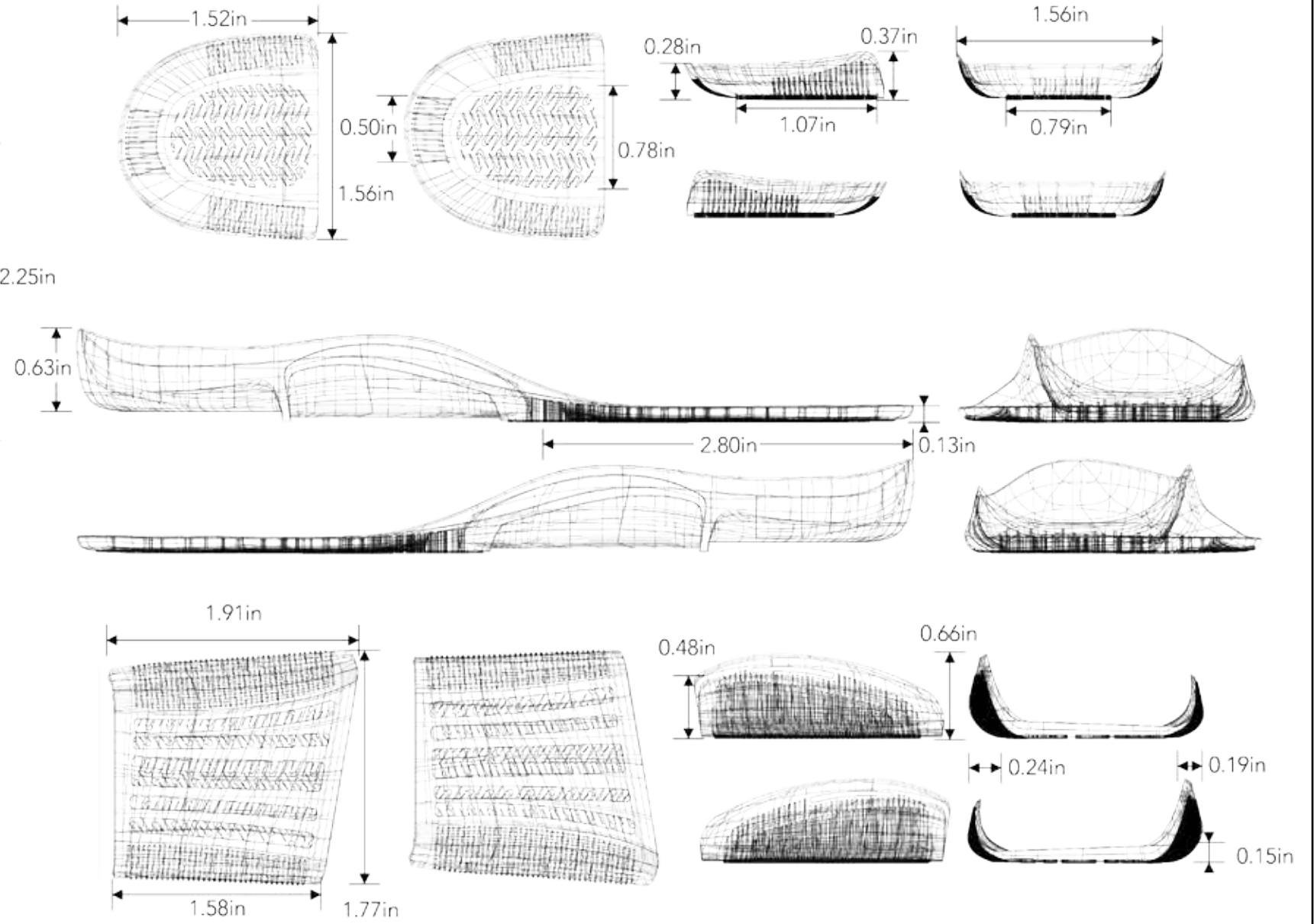
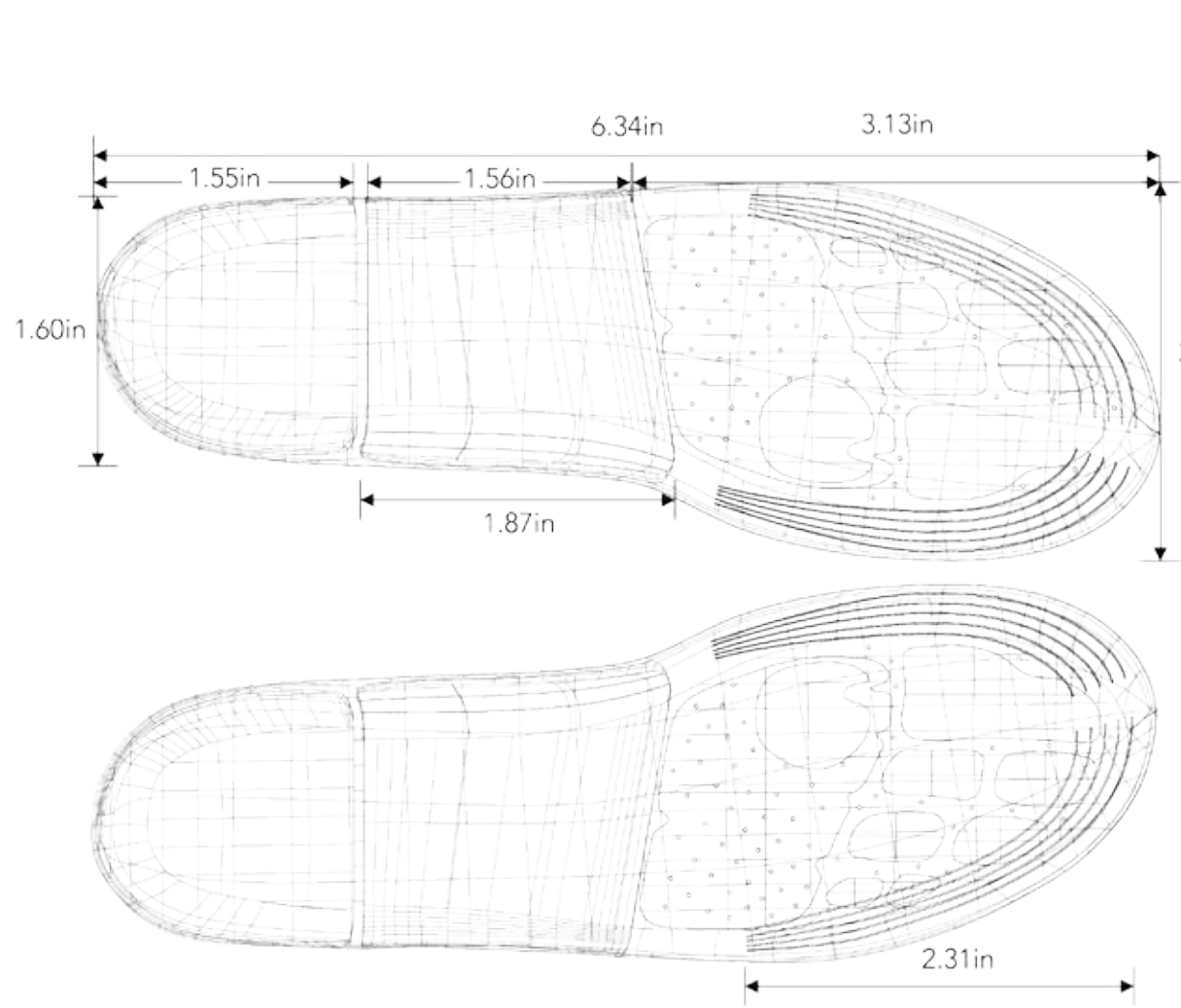


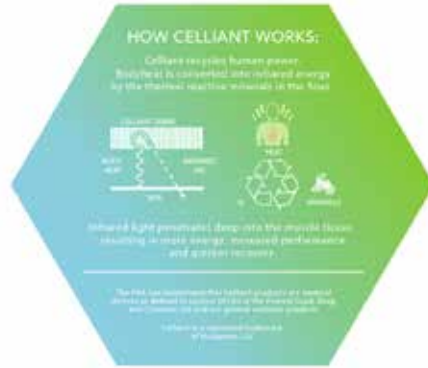


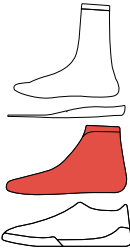
Insole CAD Techpack

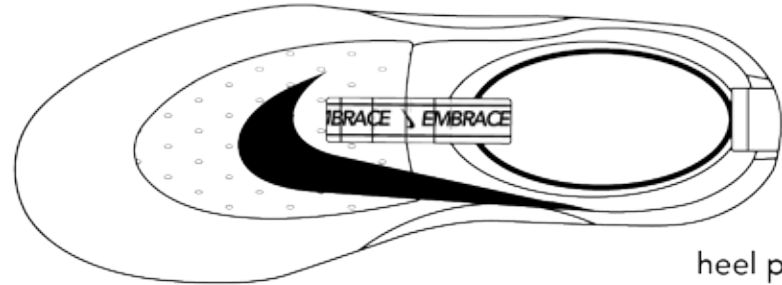
Used for 3D printing full scale insole base, heel, and arch support pieces.

Men's/Women's	Colorway: N/A	
Insole	5/5/18	Scale N/A





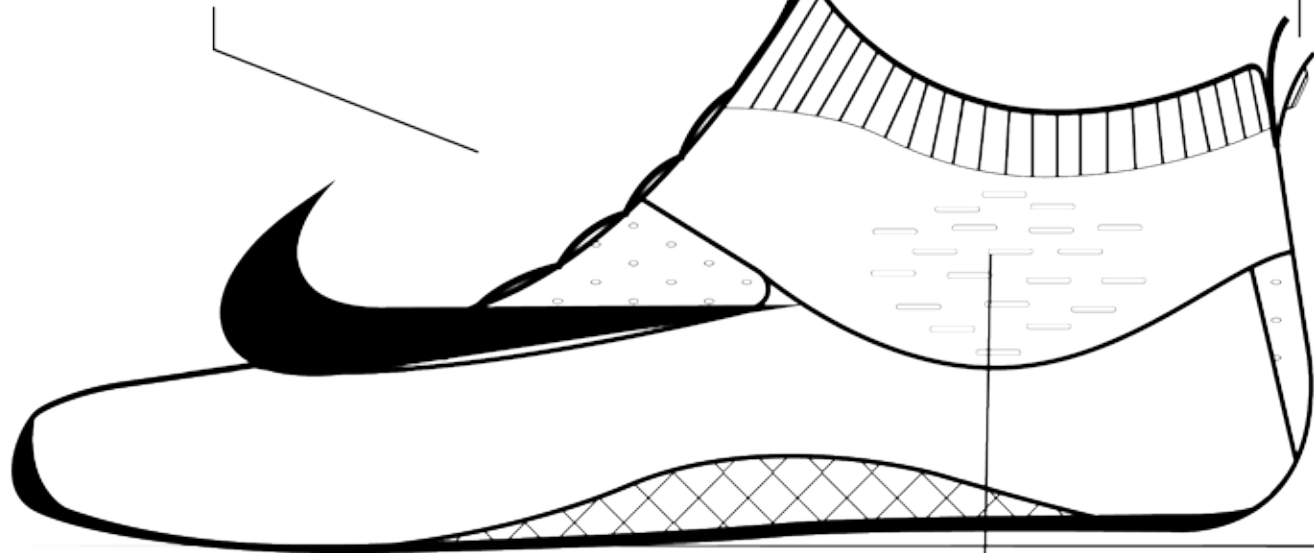
			Removable Brace – Standard		
			Knit piece used to provide additional support to the foot, with variations for injury assistance.		
Men's/Women's		Colorway: N/A			
Sockliner		5/5/18		Scale N/A	



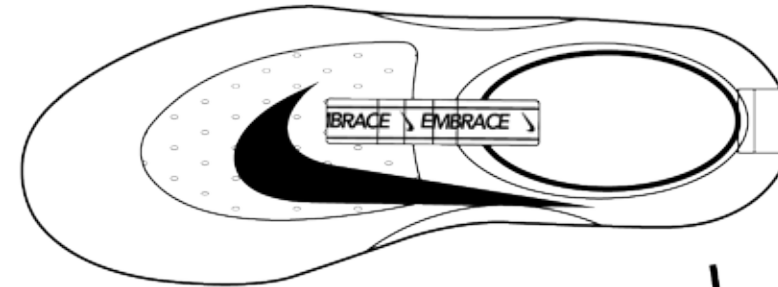
heel pulls webbing

Low profile

Ideal for hot summers and warmer climates, for when you're wearing low-cut socks, or for skaters who prefer a more free ankle.

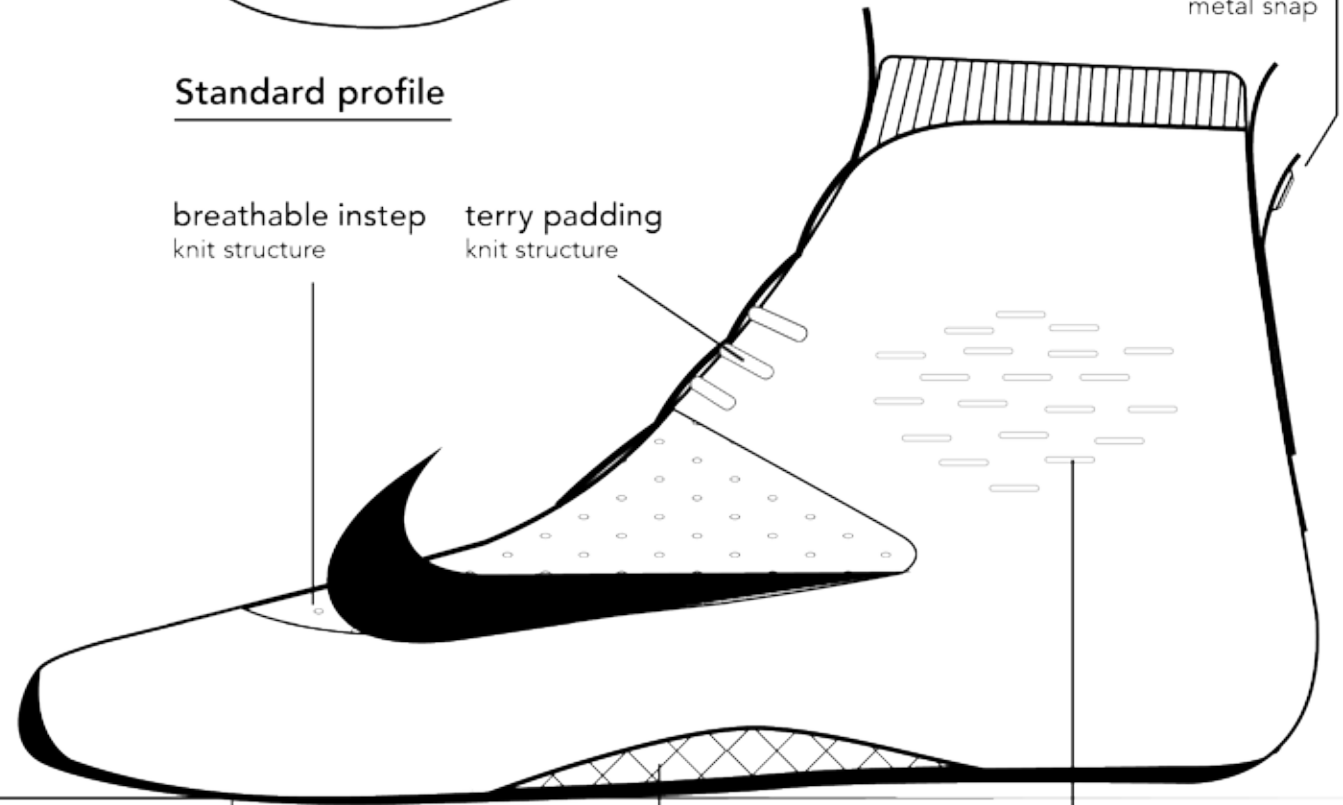


breathable ankle pointelles knit structure



Standard profile

breathable instep knit structure terry padding knit structure

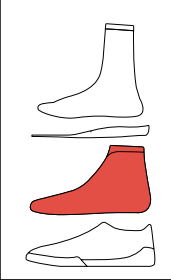


GRILON base knit structure

stiffer arch support knit structure

breathable pointelles knit structure

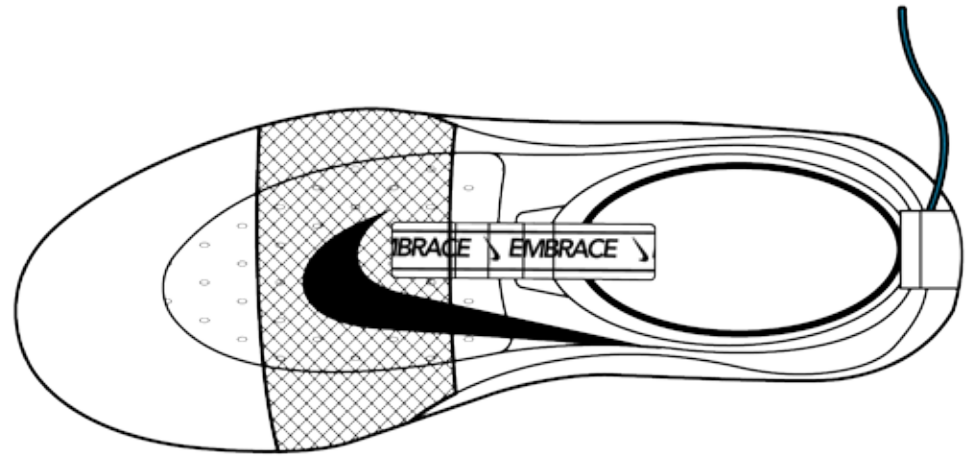
shoe connection snap metal snap



Removable Brace – Heel Brace

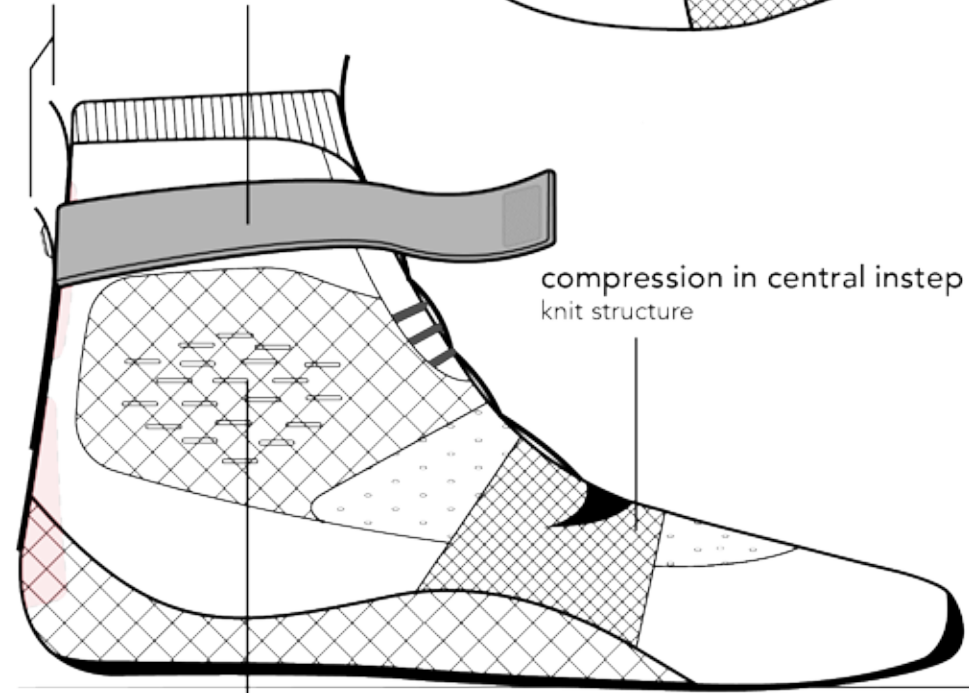
Knit piece used to provide additional support to the foot, with variations for injury assistance.

Men's/Women's	Colorway: N/A	
Sockliner	5/5/18	Scale N/A

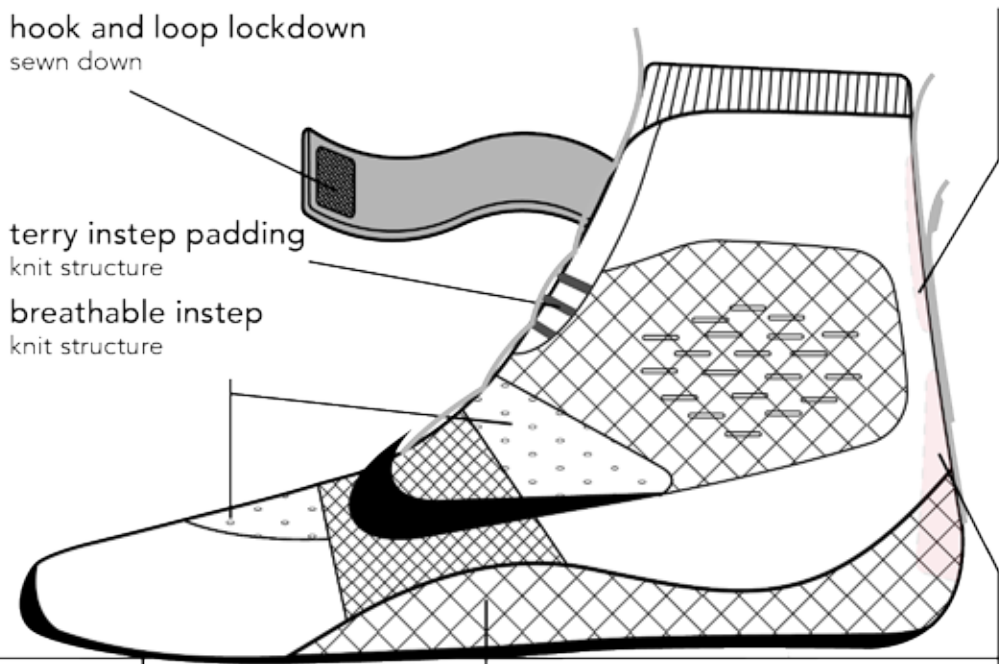


heel pulls webbing
pull-over strap elastic

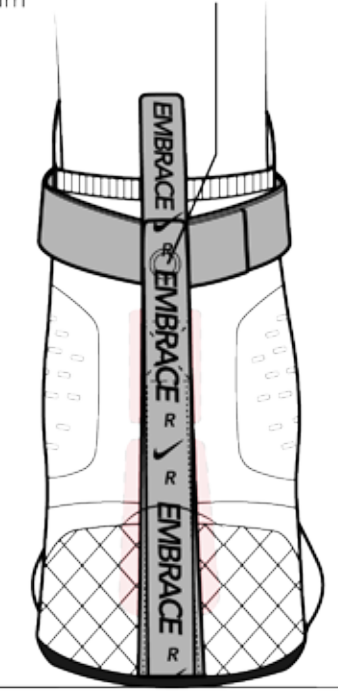
heel support closed-cell foam
shoe connection snap metal snap



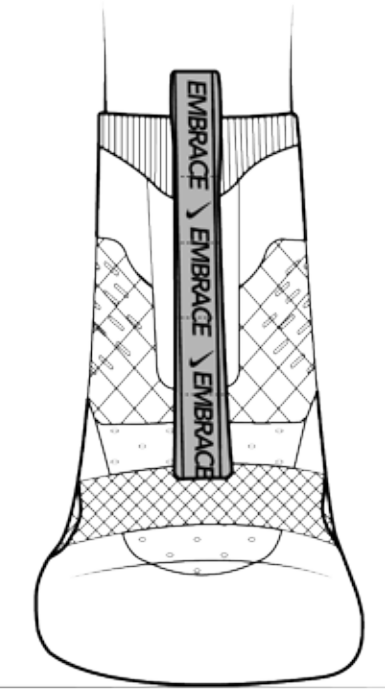
Lateral View



Medial View



Back View



Front View

hook and loop lockdown sewn down

compression in central instep knit structure

terry instep padding knit structure

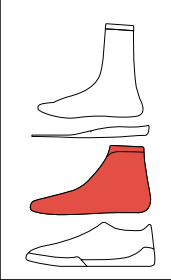
breathable instep knit structure

breathable ankle pointelles knit structure

GRILON base knit structure

stiffer arch support knit structure

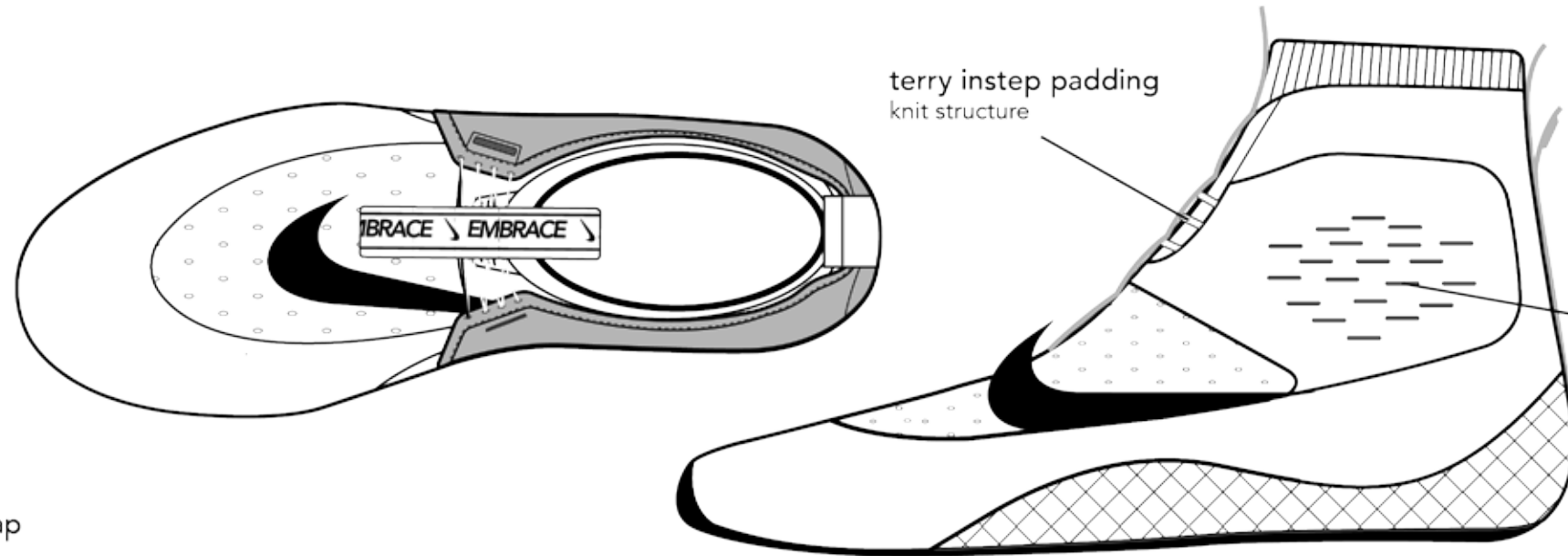
heel support closed-cell foam



Removable Brace – Ankle Brace

Knit piece used to provide additional support to the foot, with variations for injury assistance.

Men's/Women's	Colorway: N/A	
Sockliner	5/5/18	Scale N/A



terry instep padding
knit structure

breathable pointelles
knit structure

shoe connection snap
metal snap

heel pulls
webbing

side wrap
neoprene

pull-over strap
neoprene

ankle side support
closed-cell foam

adjustable laces
elastic

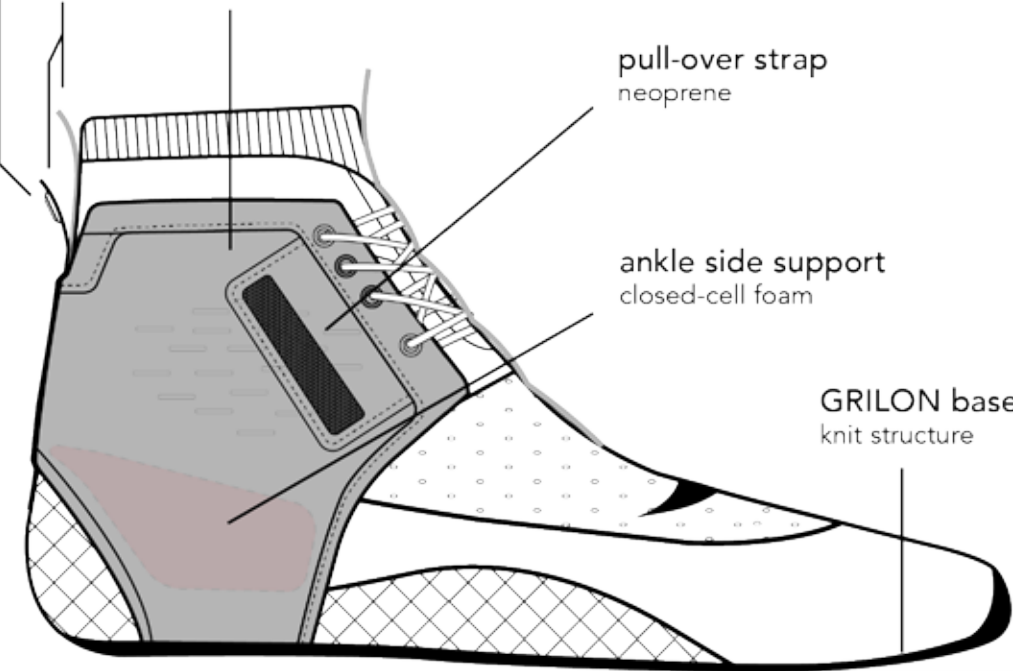
breathable instep
knit structure

GRILON base
knit structure

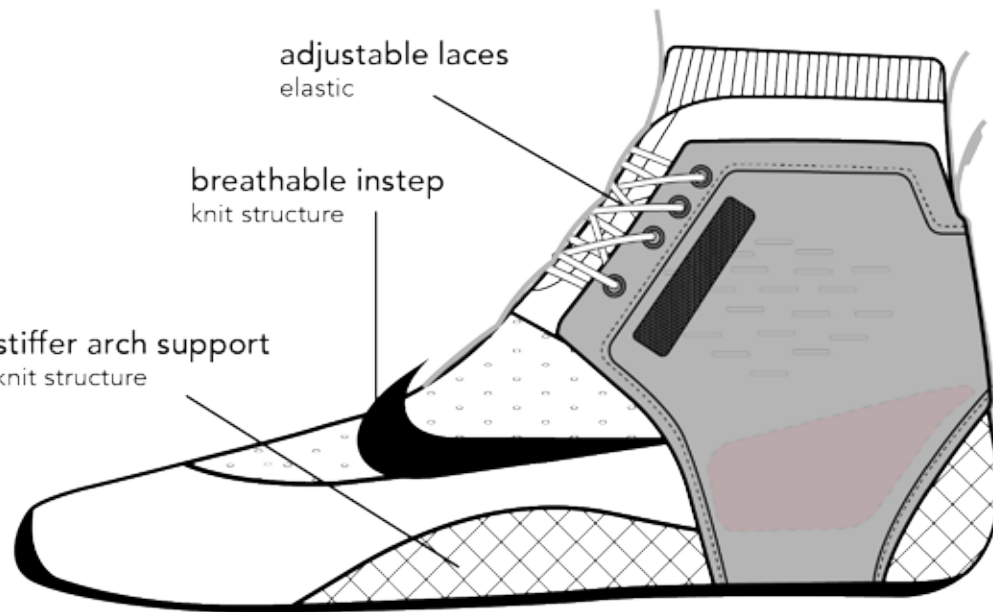
stiffer arch support
knit structure

shoe connection snap
metal snap

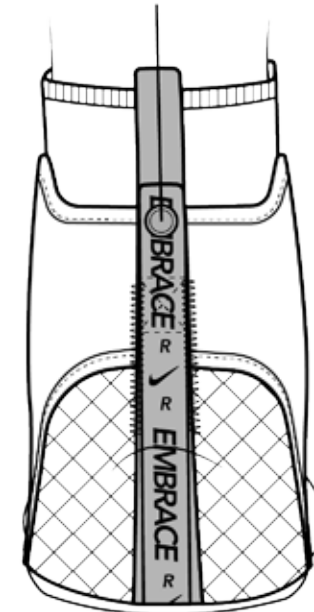
hook and loop fastener
for pull-over strap
velcro



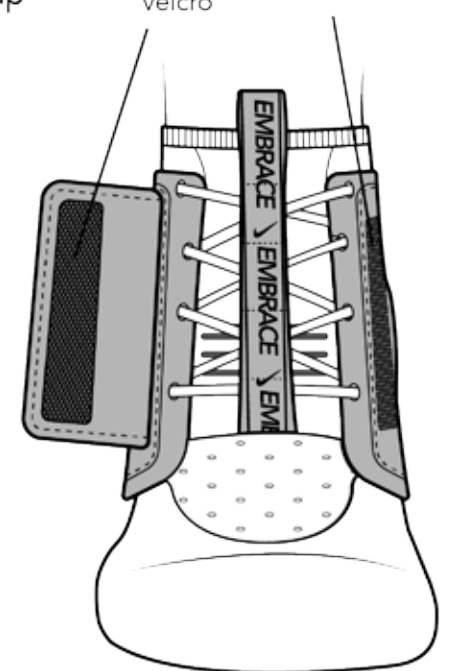
Lateral View



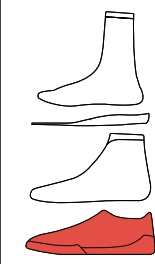
Medial View



Back View



Front View



Skate Shoe Techpack – Mid

Detailed techpack for the mid-top version of the skate shoe.

Size 9D / 43	Colorway: Black/Barcelona
Skate Shoe	5/5/18
	Scale N/A



Medial View



Lateral View



Toe View



Heel View

heel tag
synthetic leather
TPU Nike logo
lace holes
inside lace loops
vamp emboss
TPU mudguard

Nike SB logo
vamp perforation
eyestay emboss
jacquard warp-knit composite

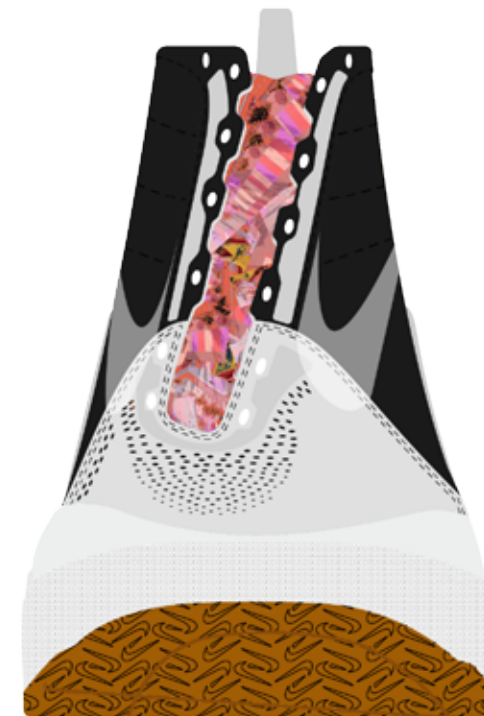
heel tag
snap



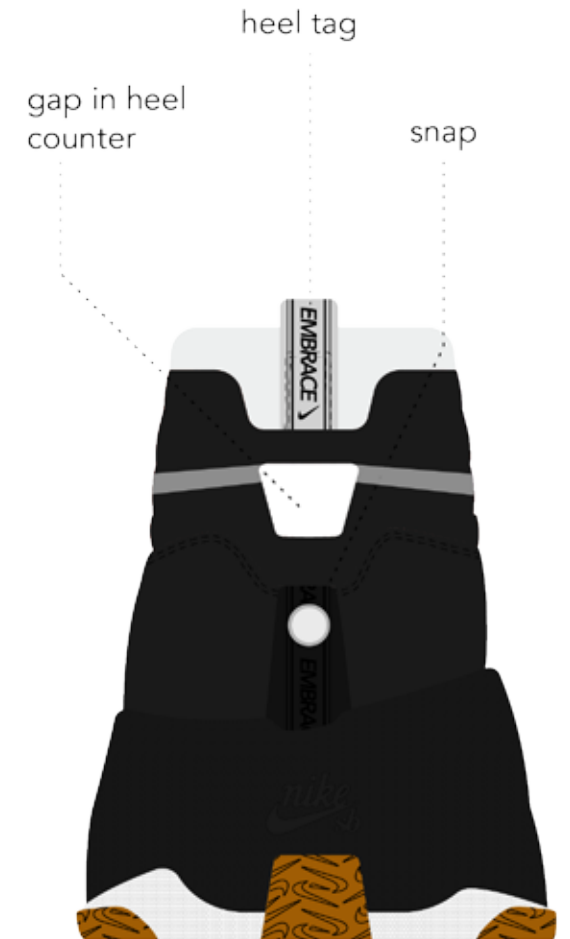
Medial View custom warp-knit composite neoprene



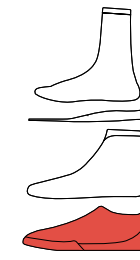
Lateral View



Toe View



Heel View

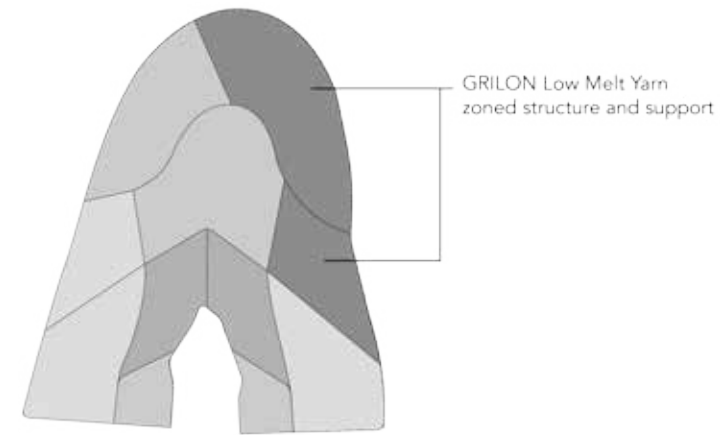
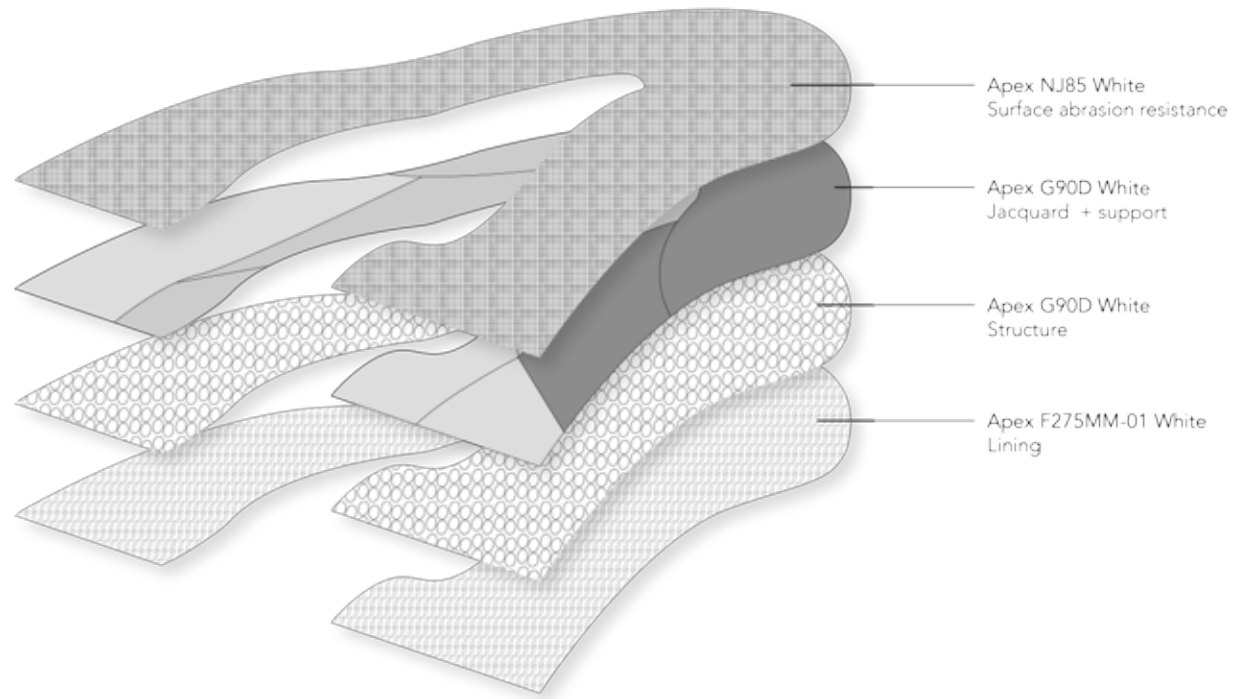


Skate Shoe Techpack – High

Detailed techpack for the high-top version of the skate shoe.

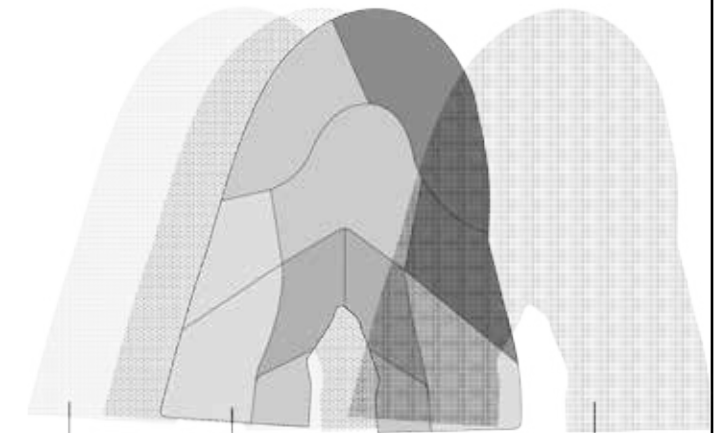
Size 9D / 43	Colorway: Black/Copenhagen
Skate Shoe	5/5/18
	Scale N/A

			Warp-Knit Composite Techpack		
Layers detailing the construction of the upper of the skate shoe.					
Size 9D / 43		Colorway: N/A			
Skate Shoe	5/5/18	Scale N/A			

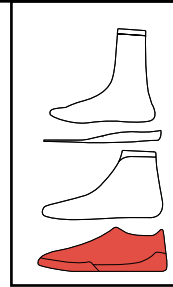


EMS-GRILTECH's Thermoplastic Specialty Yarns are made from bicomponent fibers and abrasion-resistant polyamide fibers.

When heated, the fibers in the added areas fuse together with their cross-fibers, creating a stiffer, more abrasion-resistant structure.



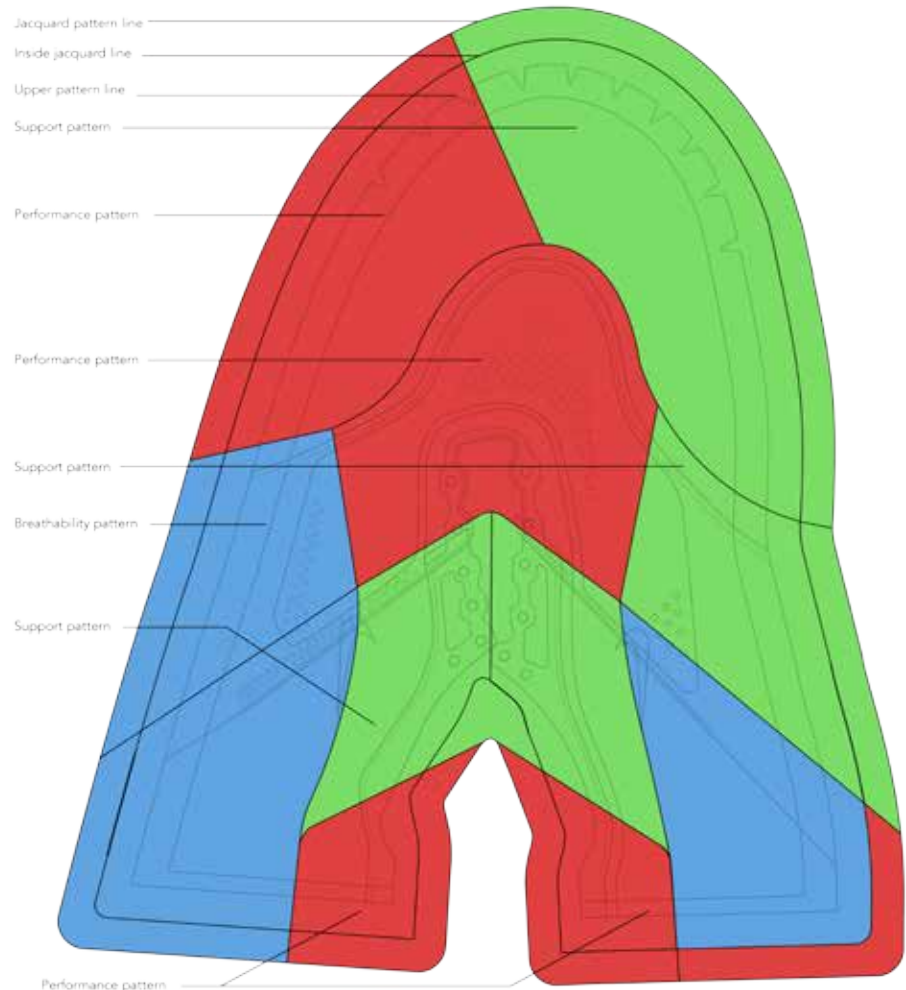
Interior lining and surface layer are die-sublimated with custom patterns to introduce color and inspired patterns.



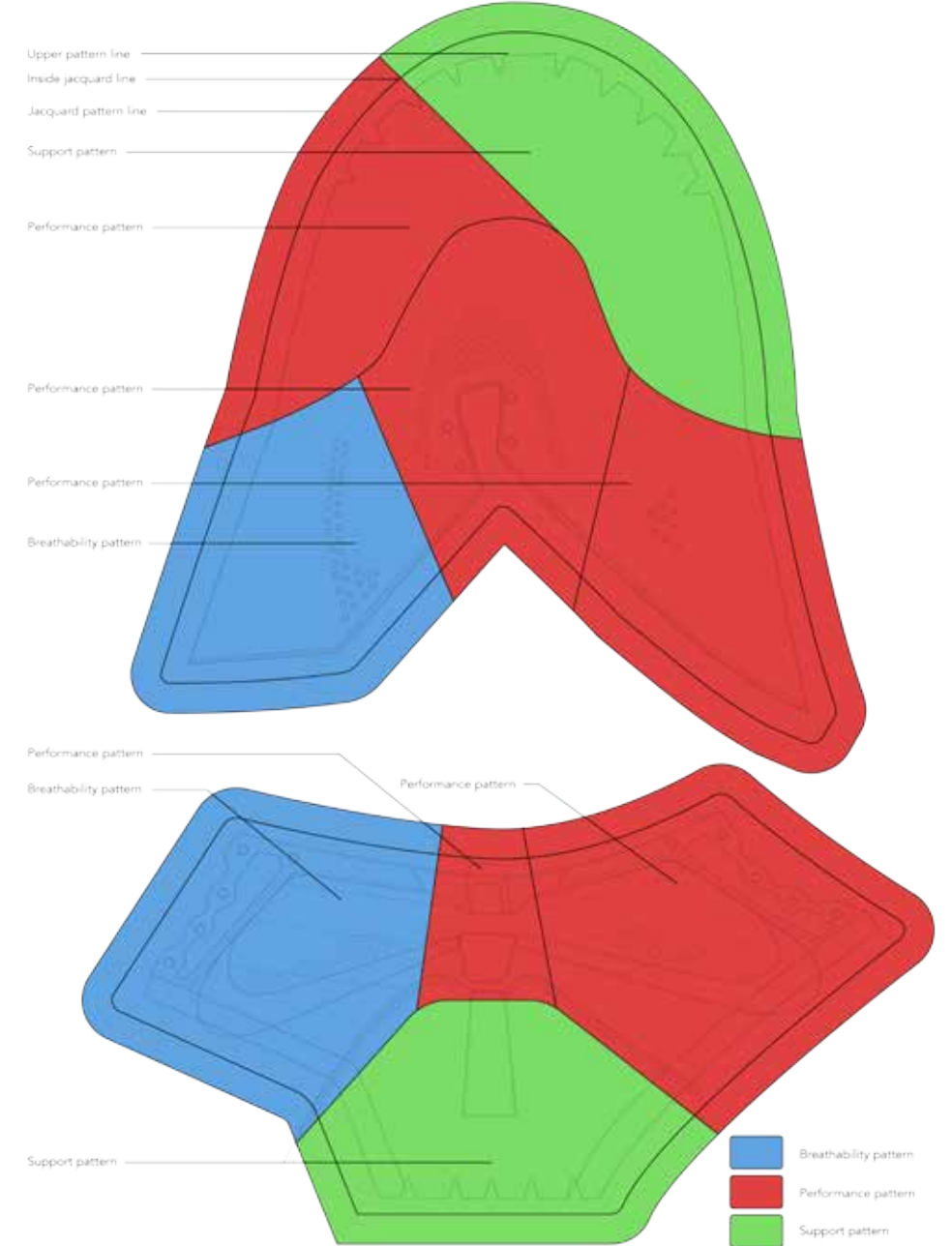
Warp-Knit Composite Techpack

Layers detailing the structure placement within the jacquard upper layer of the skate shoe.

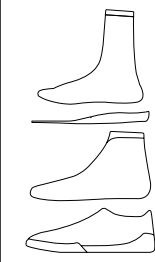
Size 9D / 43	Colorway: N/A	
Skate Shoe	5/5/18	Scale N/A



- Breathability pattern
- Performance pattern
- Support pattern



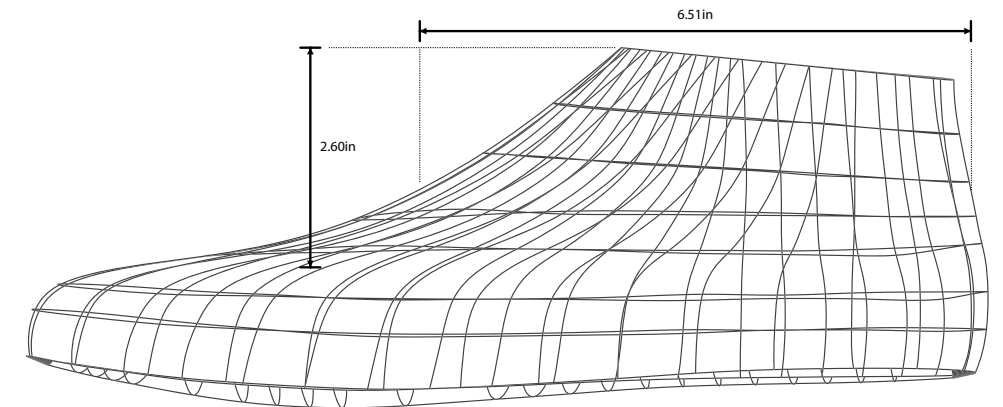
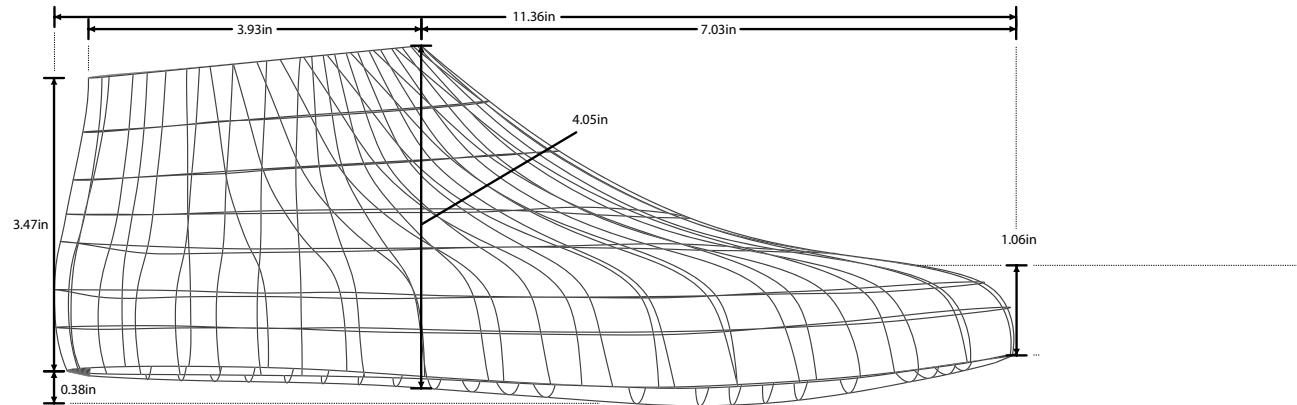
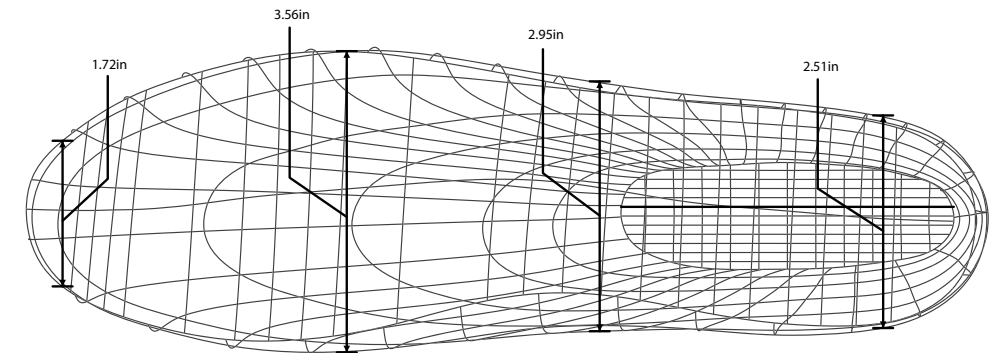
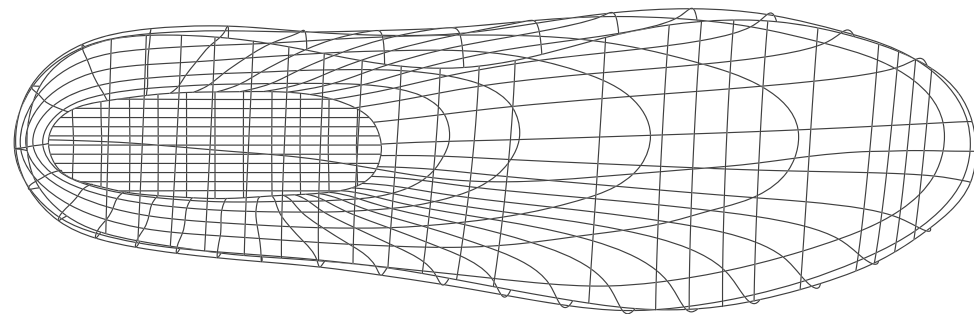
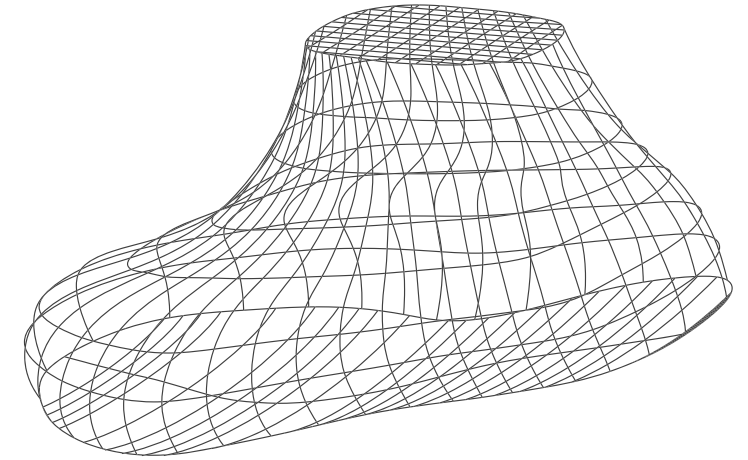
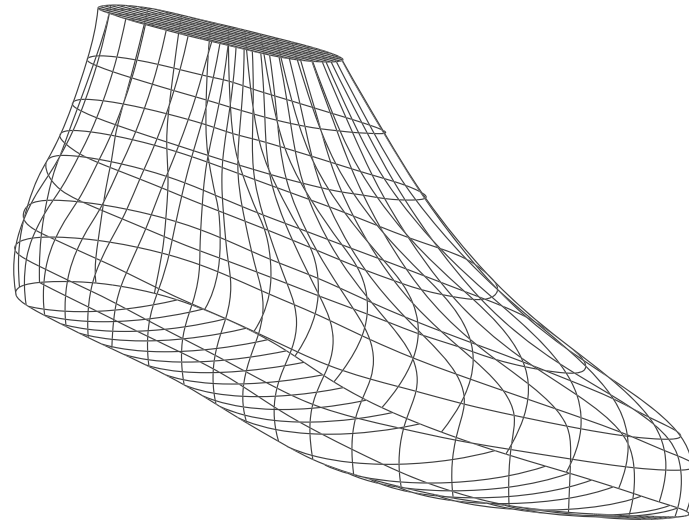
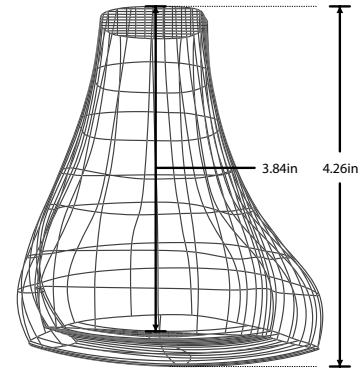
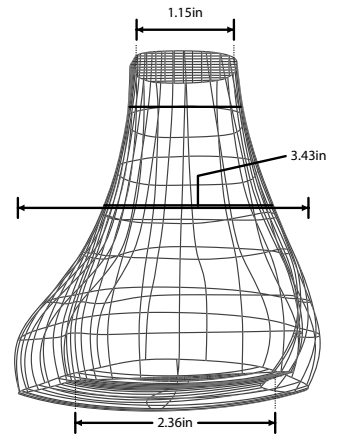
- Breathability pattern
- Performance pattern
- Support pattern

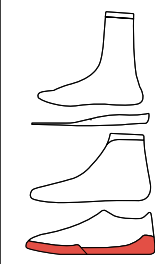


Shoe Last Techpack

Used for 3D printing full scale lasts used in pattern making, fit, construction.

Size 9D / 43	Colorway: N/A	
Skate Shoe	5/5/18	Scale N/A





Outsole Techpack

Communicating exact design details and construction for the outsole, midsole, and shank.

Size 9D / 43

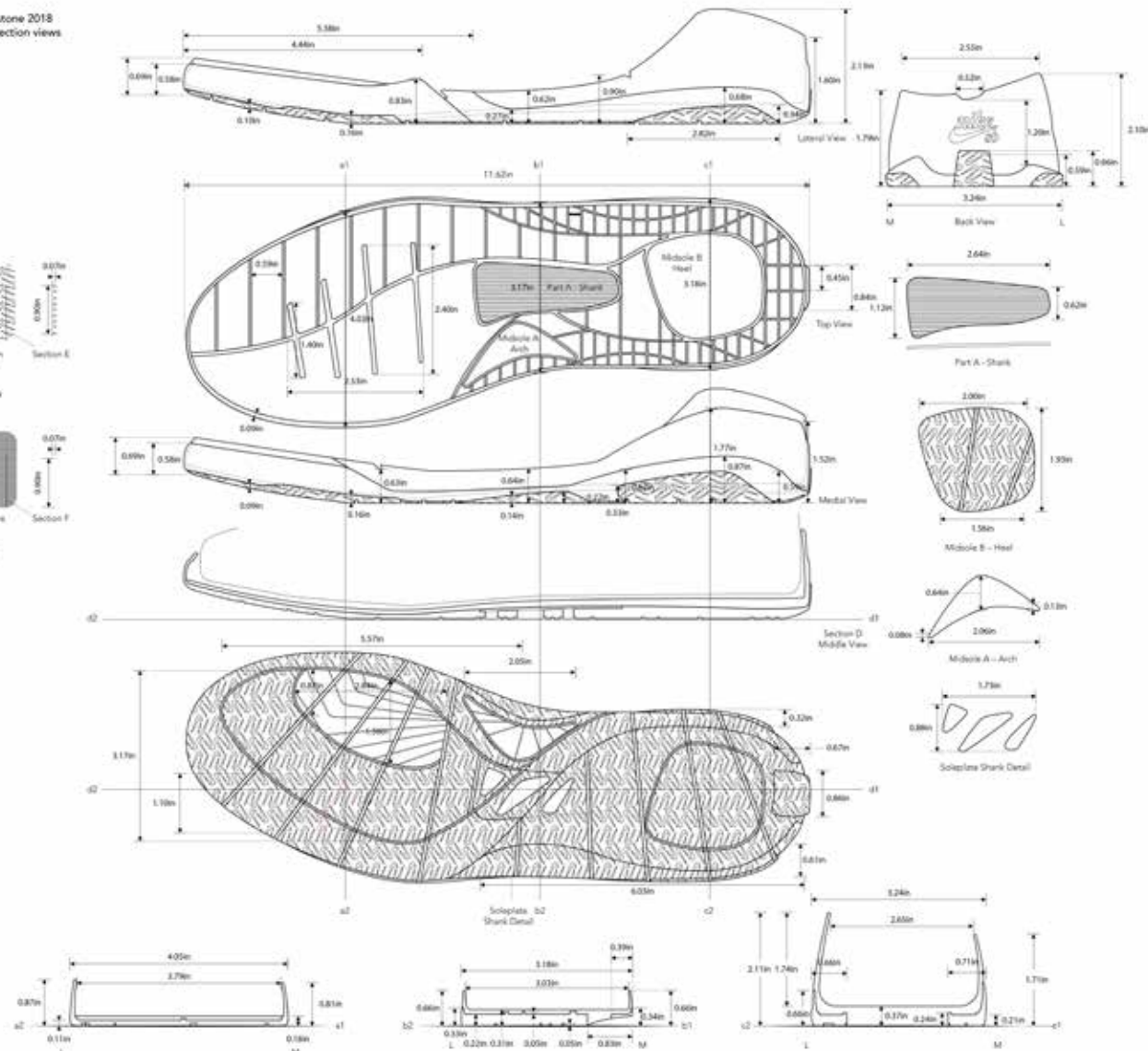
Colorway: N/A

Skate Shoe

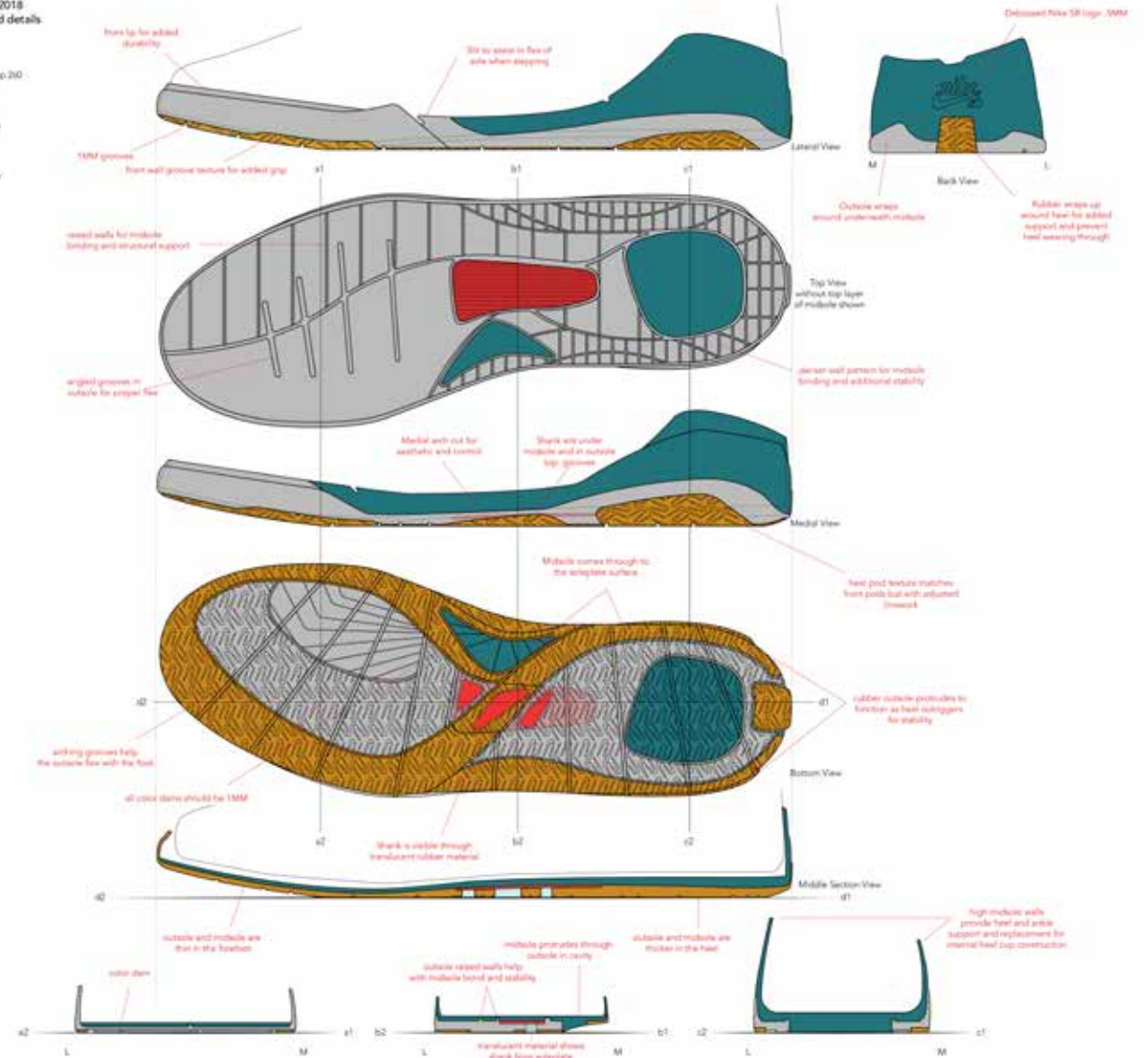
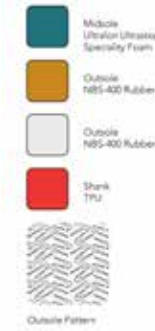
5/5/18

Scale N/A

Matt Selnick Capstone 2018
Dimensions and section views



Matt Selnick Capstone 2018
Material breakdown and details





Softy's Box

\$50

Standard Insole
Standard Sockliners
High Performance Compression Socks

- Socks: High Performance
- Socks: Performance
- Sockliner: Standard
- Shoe: None

Included: Standard Insole

Colour Shown: Grey/Green
Style: SOCS151-518

[Read More](#)

ADD TO BAG



Standard Kit

\$120

Standard Insole
Standard Sockliners
Low or High Skate Shoe

- Socks: None
- Insole: Standard
- Sockliner: Standard
- Shoe: Mid

Colour Shown: Black/Grey
Style: SAN1232-518

[Read More](#)

ADD TO BAG

Purchasing Options

Mockups of how the kit would be purchased online, proposing three potential kit variations.



Size N/A	Colorway: N/A	
System	5/5/18	Scale N/A



Christmas Complete Box

\$135

Standard Insole
Customizable Insole Kit
Standard Sockliners
High Performance Compression Socks
Low or High Skate Shoe

- Socks: High Performance
- Insole: Customizable
- Sockliner: Standard
- Shoe: High

Included: Standard Insole

Colour Shown: Cloud/Black/Grey
Style: EMB3515-518

[Read More](#)

ADD TO BAG

Performance Layering

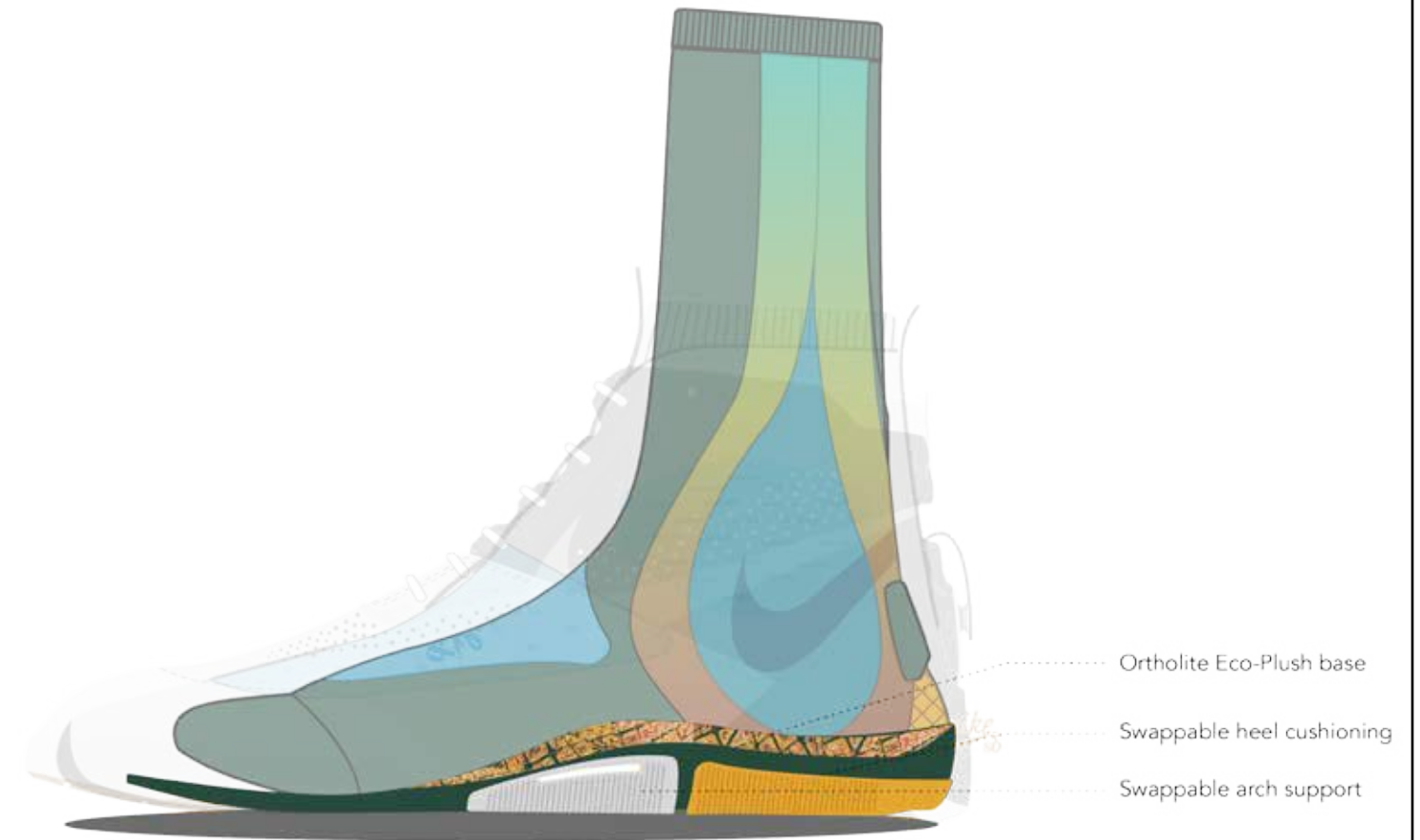
Detailing the effect of wearing the kit, indicating feature callouts of the system components.



Size N/A	Colorway: N/A	
System	5/5/18	Scale N/A



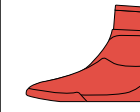
High Performance Compression Sock



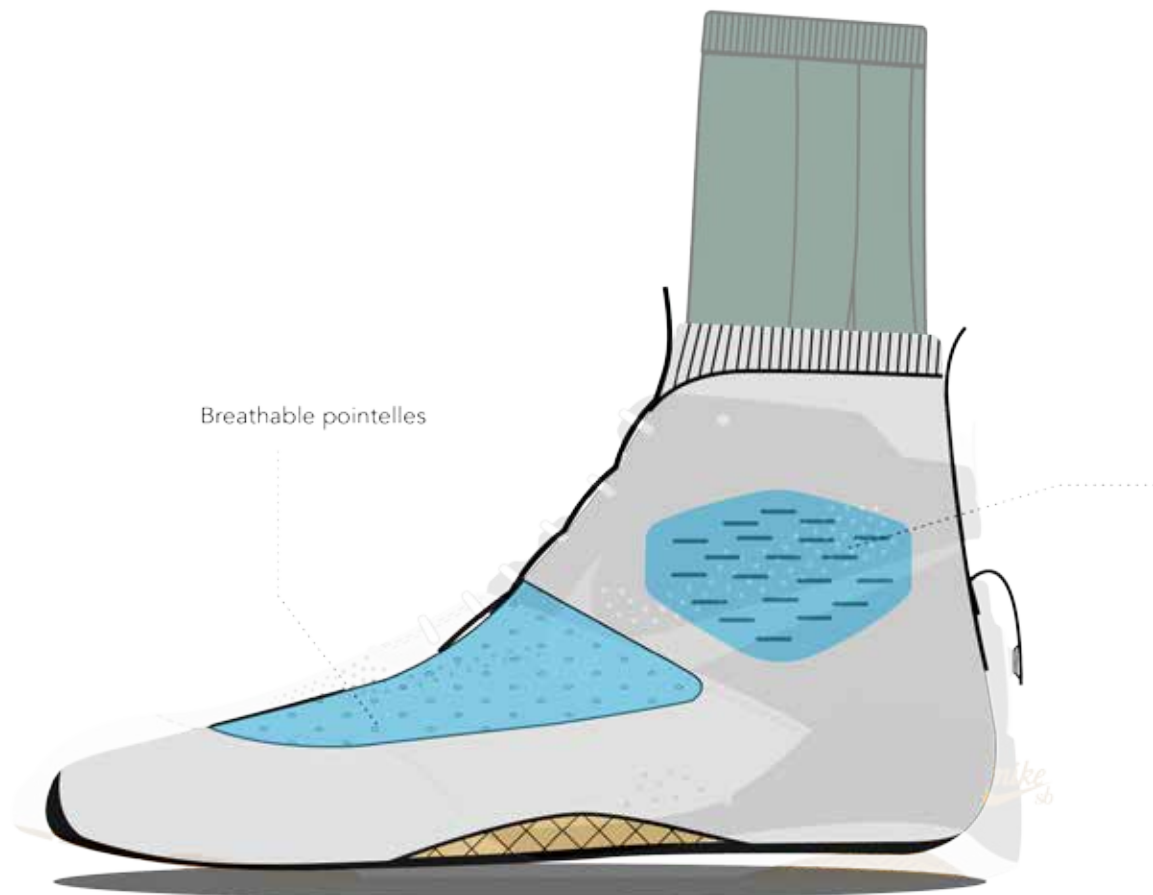
Modular Insole

Performance Layering

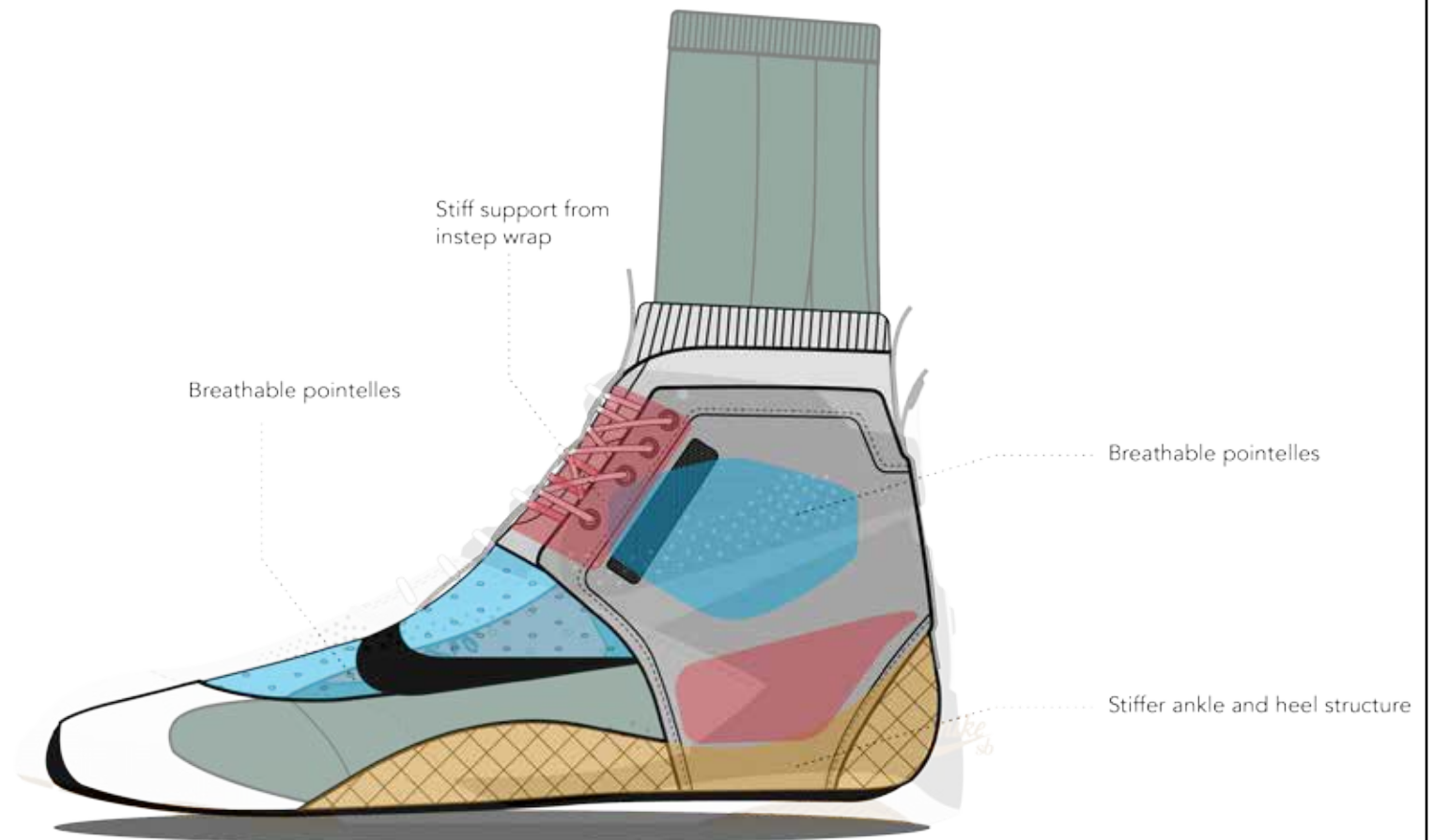
Detailing the effect of wearing the kit, indicating feature callouts of the system components.



Size N/A	Colorway: N/A	
System	5/5/18	Scale N/A



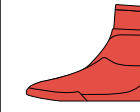
High Performance Compression Sock



Modular Insole

Performance Layering

Detailing the effect of wearing the kit, indicating feature callouts of the system components.



Size N/A	Colorway: N/A	
System	5/5/18	Scale N/A



Skate Shoe



Entire system layered together



Guangzhou, China

Despite the political and social views of its state, Guangzhou skateboarding has been growing over the past few years. While it's online access to skate media is limited, touring skate teams, promotion of skateboarding in the Olympics, and an adapting skate culture have put this city on the map. It's incredible architecture in parks like Yuexu Park, leisurely tolerance of skateboarding, and growing community are showing a positive adoption of skateboarding in China.



Barcelona, Spain

Not only is it close to the water, good weathered, and welcoming to skaters in most areas, but Barcelona also hosts some of the most beautiful (and skateable) architecture in Europe. Back in the 1990s Barcelona was a skateboarding Mecca, and still is today with spots such as MACBA, Port Forum, and many others around the city, it has become a landmark travel destination for skaters around the world.





U.S. East Coast: Philadelphia, D.C. and Boston

East coast skateboarding is iconic for its grittiness – the rough, torn up street spots and legendary plaza skating at Love Park, Freedom Plaza in D.C., and Nashua Street Park in Boston have produced some of the best skaters of the past generations. Often challenged by frozen winters and scorching summers, east coast skateboarders create an interesting blend of style and flow despite the terrain they push over.



San Francisco

Well-known for its incredible hills, seaside spots and great climate, San Francisco has always been a west coast landmark for skateboarding. Public spots like Embarcadero, 3rd and Army, China Banks have become legendary, and the cities growth through skateparks, companies, and youthful gentrification have made it into what it is today.





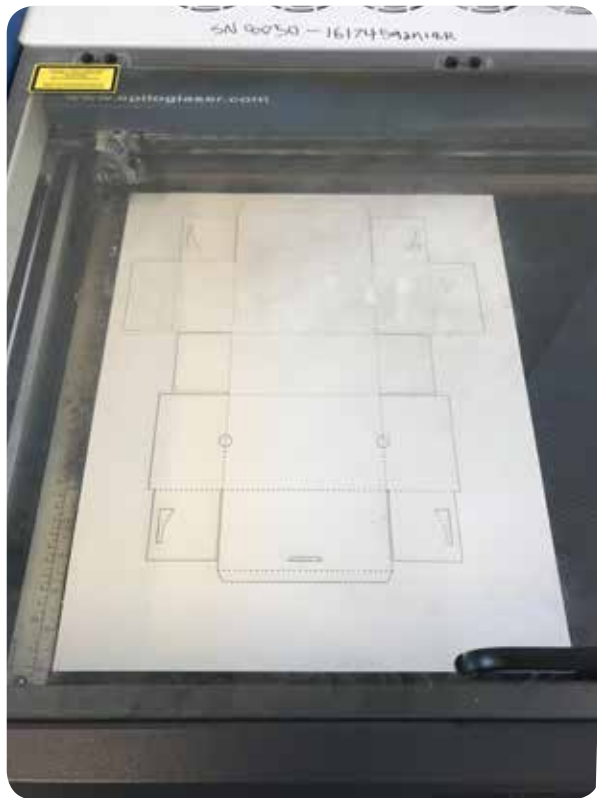
Copenhagen, Denmark

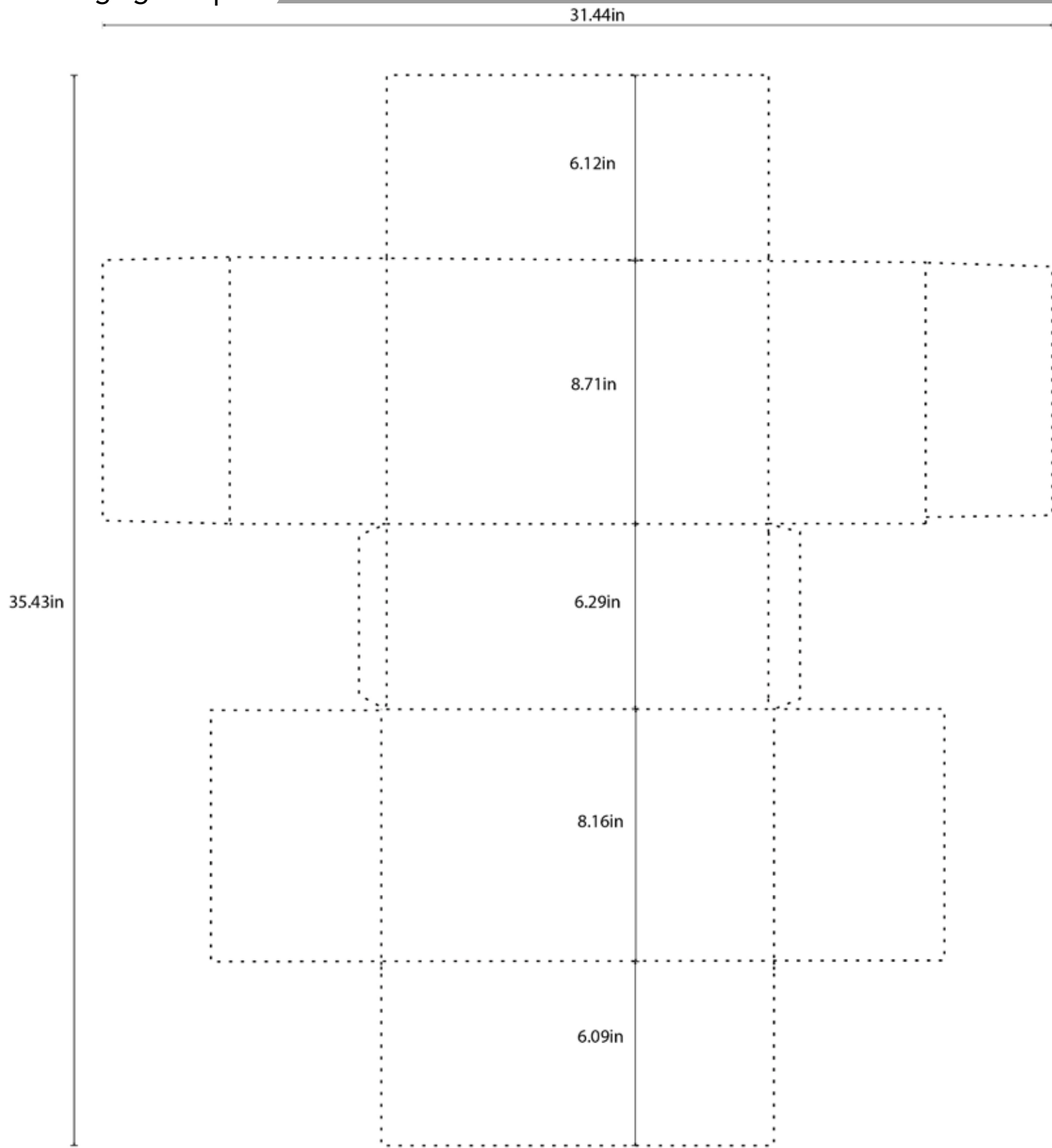
Due to a sudden boom in building projects in the past decade, new spots and skateparks are constantly popping up around the Danish city. In relation with the city's rather small size and easy means of transportation, the city continues to make its mark in skate media with spots like Jarmers Plads and Fælledparken and the beautiful city in between. While winters are harsh in Denmark, summers are temperate and with the large acceptance of skateboarding, Copenhagen's growth continues.

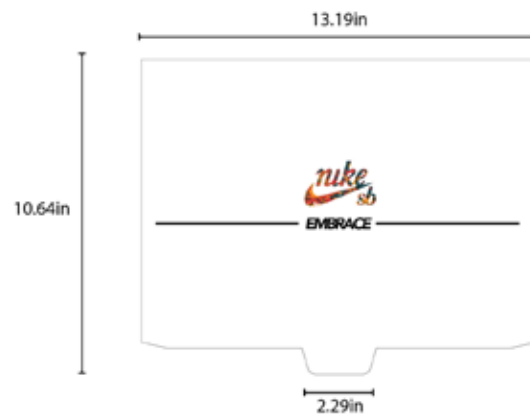


Because of the versatility and customization of the die-sublimation process onto warp-knit fabrics, creating collaborations with skateshops, pro-skaters, and other brands would be much more possible and affordable for Nike.









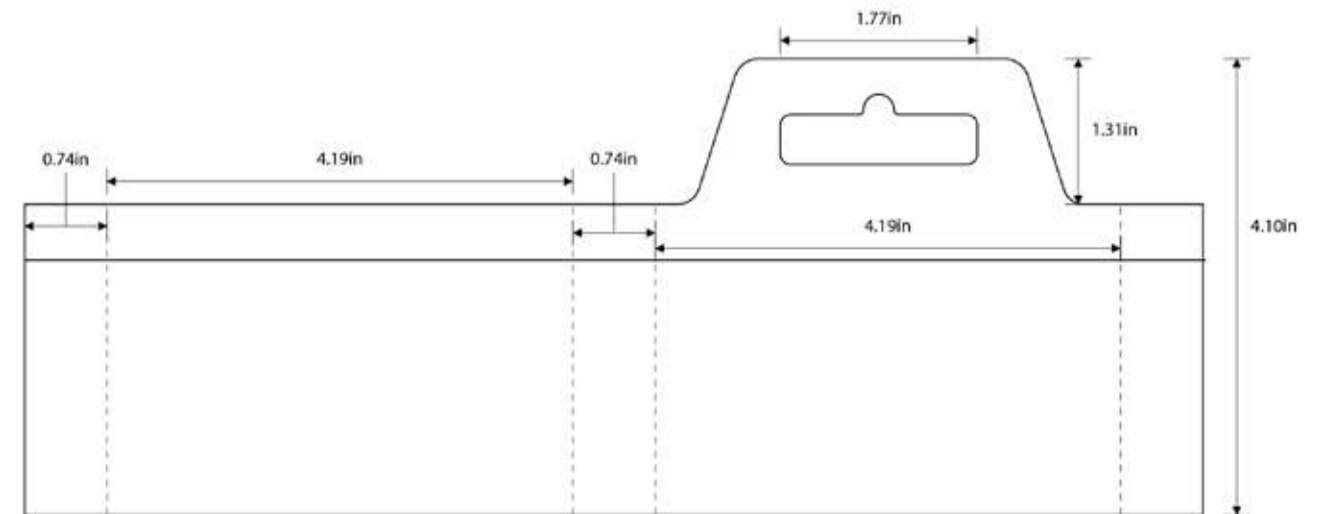
Shoe box packaging die.



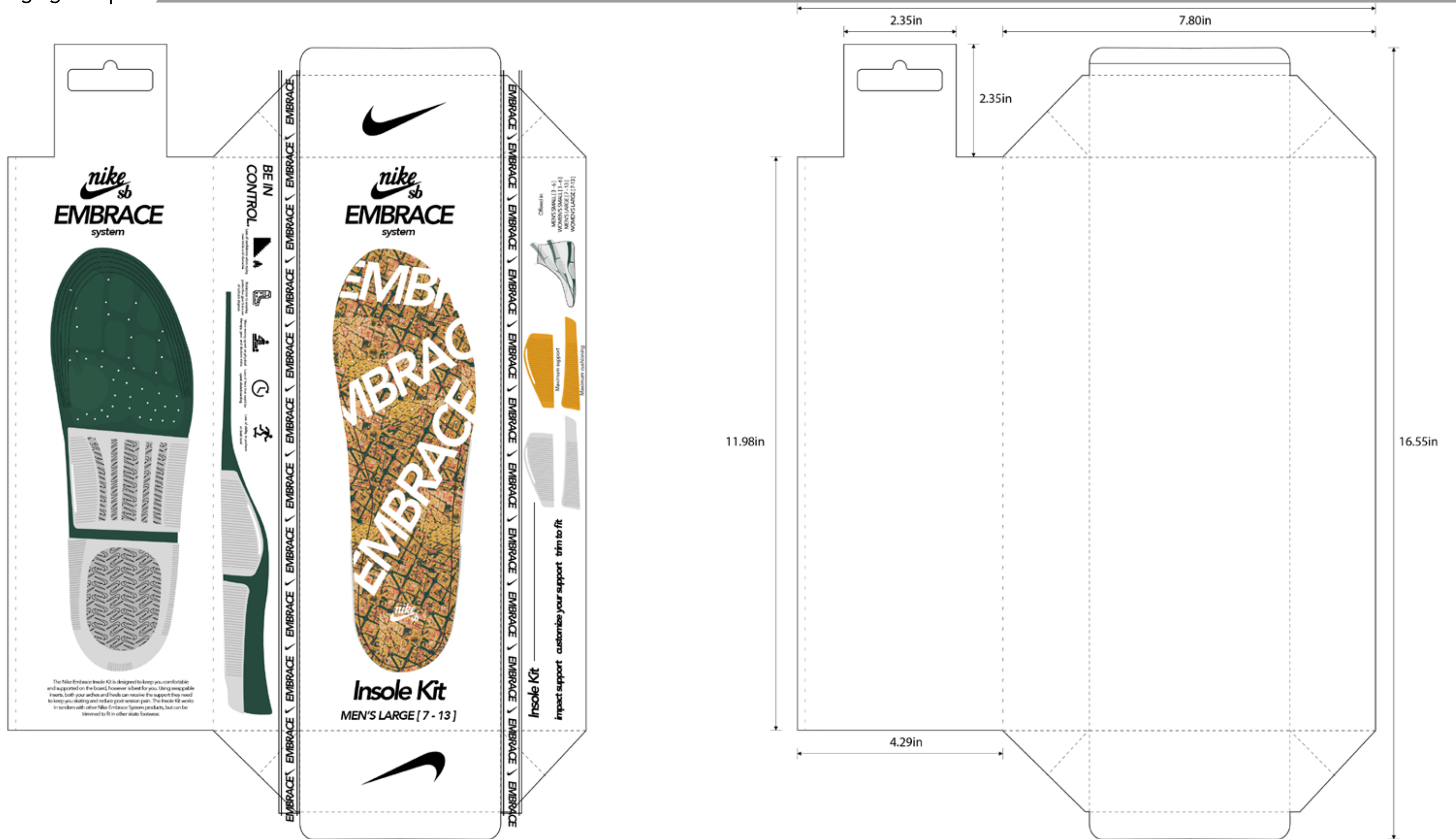
RACE ✓ EMBRACE ✓ EMBRACE ✓ EMBRACE ✓ EMBRACE ✓ EMBRACE ✓ EMBRACE ✓ EMBRACE ✓ EMBRACE ✓ EMBRACE



RACE ✓ EMBRACE ✓ EMBRACE ✓ EMBRACE ✓ EMBRACE ✓ EMBRACE ✓ EMBRACE ✓ EMBRACE ✓ EMBRACE ✓ EMBRACE



Removable Brace/Sockliner and Sock packaging dies.



Insole Kit packaging die.







To learn more, visit Nike.com/skateboarding/embrace.



9 Moving Forward

Project Takeaways

Developing this project helped me grow in many different areas, not only in communicating and working with professionals in textiles, materials supply, doctors and physiotherapists, and footwear designers, but in learning how to self-drive and push forward a project by myself. Developing a system of products was a task that I had no idea how it would come to life, and the experience gained from that process has helped me grow as a designer much more than becoming slightly more of an expert in the areas needed to develop them. There's a lot more to be done to bring this concept to life, but the capstone process has facilitated the foundational development and growth to help me understand how to take my initial insight from a thought in my head to what could be a product on the shelf.

Broader Impact

Change the way that skateboarders invest in their footwear so that they are more aware of their health, and prepared so they get injured less from skating.

Through brand adoption or through self-launch, my goal is to eventually bring this concept (or parts of it) to market, and to develop further innovations towards this cause, so that hopefully all skateboarders can continue to do what they love and feel confident in doing so.

10 Appendix



Consumer Personas

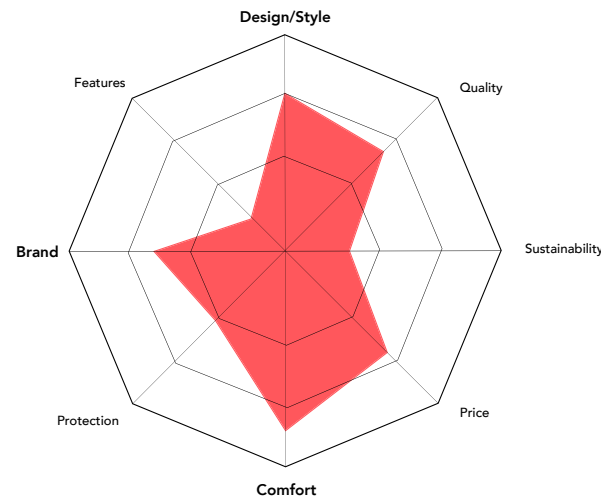
In order to provide products that all skaters would be interested in buying, I developed consumer personas that would help me understand the wants and needs of the different potential users.



Reed – 10 years old – Northeastern Massachusetts, USA

He's been skating for a little over one year. Skates in his neighborhood every day after school, and his mom drives him and his friends to the local skatepark on the weekends. He goes through shoes every two months, and typically buys whatever will hold up, but likes to try new styles and colors. He typically chooses between C1rca, Vans, and Emericas.

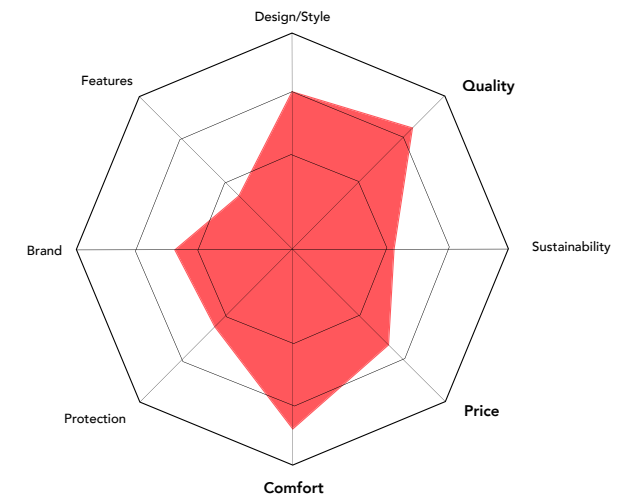
Young skateboarders skate much more often and for longer sessions, and are the most prone to injuries because of their lack of experience and willingness to try new and larger things. They often lack regard for stretching and health because of their younger physiques, but are usually subject to their parents judgment and concerns. They will typically start with small ramps and drops, and increase in size as they become comfortable, skating all types of street, transition, and flatground terrain.



Camila – 21 years old – Mar Del Plata, Argentina

She's been skating for 8 years. She typically buys what she can wear when not skating too, but it needs to have enough padding. Skates a few times a week at the local park and in the streets every once in a while, usually with her brothers. She goes through shoes every three months, and typically chooses from Adidas, Vans, and DC shoes.

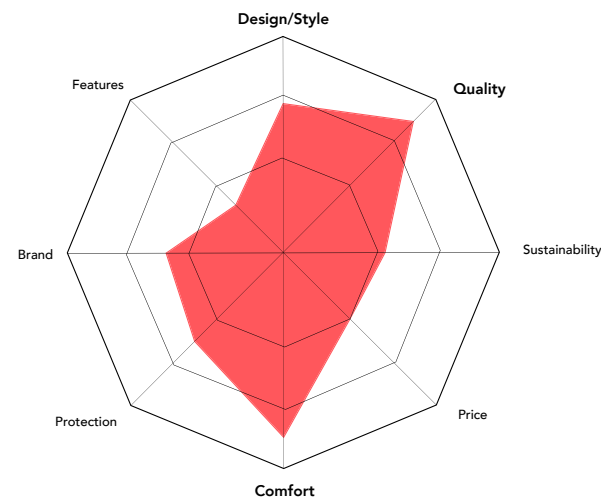
Typically, many skateboarders begin to skateboard less often once they've grown out of their teenage years, most often because of work or additional schooling. They often are trying to find time to skate between being busy and will typically be between obligations or errands when they have a session, rather than spending a full day like they did when they were younger. They are beginning to feel the effects of age taking their toll after sessions, especially if they push themselves harder than they have in a while. Many are reaching their prime years during this time however, and will skate anything and everything as they grow their trick arsenal, typically still pretty resistant to serious injuries. Coming of an age of social awareness, they often decide whether or not they care about the ethics behind their products, often the environmental impact of their skate shoes or which brands are socially responsible.



Johan – 28 years old – Copenhagen, Denmark

He's been skating for 15 years. Skates at the park after work three times a week, but skates through the city to get around with friends on the weekends. He goes through shoes every three months, and typically buys for the style and comfort and to support his favorite pros. He typically chooses between Adidas, Nike, and eS.

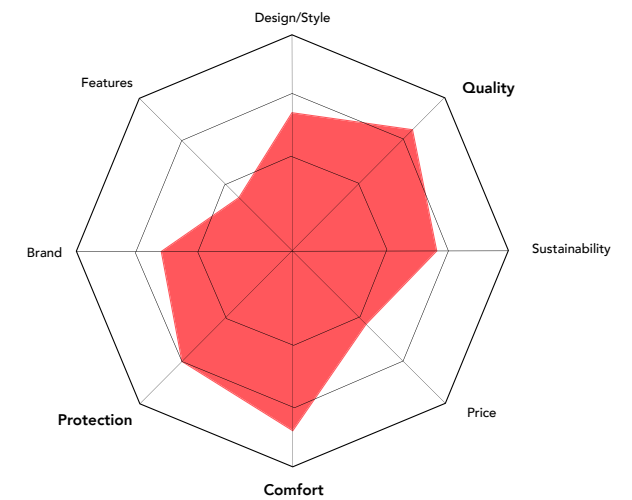
Skaters in the latter-half of their twenties often are shifting in the type and amount of skating that they do, typically less than they did even in their early twenties. They are often gaining more responsibilities and have less available time or energy to skate the way that they used to. Many stop skating around this age, but those that do keep in mind how they'll feel the next morning and begin making efforts to reduce the soreness and stiffness they feel between sessions.



Ronnie – 42 years old – Southern California, USA

He's been skating for 30 years. Skates once a week if he's lucky, usually on the weekends at the local park with his buddies. He goes through shoes every four to six months, and typically buys for the comfort and ankle protection. He typically chooses between the Vans Pro line, DC, or eS Accels.

Older skateboarders have a longer sore period than younger skateboarders, as they generally are only about to skate one or twice a week, meaning that their muscles are not as prepared for the session as they would be if they skated every day. Proper hydration, stretching, and a diet can help significantly with making your body prepared, especially with age. Many older skateboarders are worried about the impact on their work life and social life outside of skating and the potential for more serious injury. Bowl and ramp skating is safer and easier for older skaters, because they require less impact and movement off of the board. Pads are more appreciated for older skaters, as simple slams can put you out for longer, but are usually not adopted in practice until it's too late.

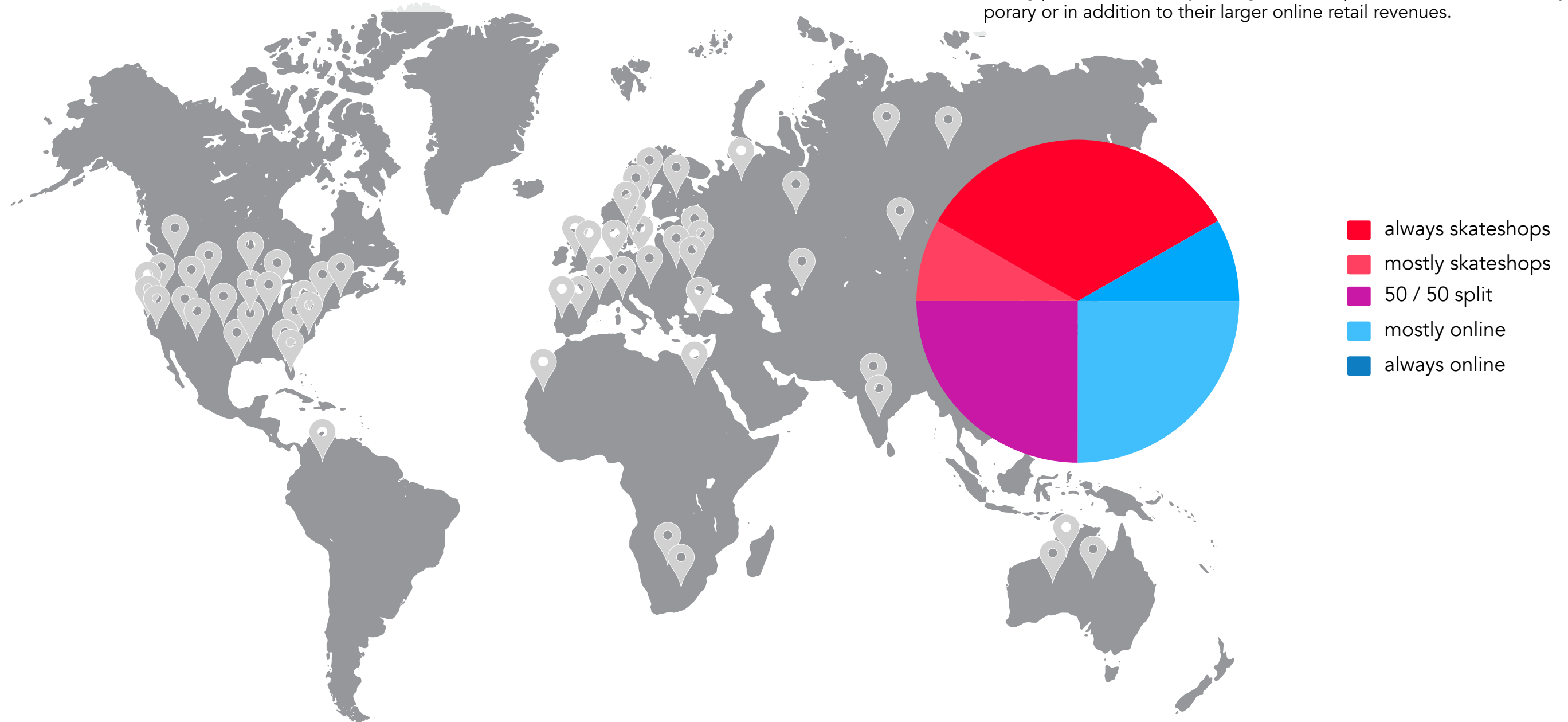


Skateboarding is different all over the world. The style, trick selection, and spots are totally different in the center of Hong Kong from those in the steep hills of San Francisco.

The world of skateboarding has exploded through the internet, websites like YouTube and Vimeo. The growth of eCommerce has influenced the retailing of skateboarding as well. Skateshops around the world have gone out of business, shifted to partially online retail, or formed distributions in order to compete with larger brands and chains like Zumiez.

When I asked skaters where they shop for their goods, the breakdown was fairly split between those who strictly purchased their shoes, accessories, boards, and more at skateshops as there were online. A significant portion do both evenly as well. Based on this feedback, I concluded that the purchasing decisions of many skateboarders are very hesitant, as they are torn between convenience and selection, and staying true and supporting the core shops in their local communities.

Some larger companies have tried to introduce support for this problem by selling product exclusively through skateshops, but these are often only temporary or in addition to their larger online retail revenues.



Over 300 million pairs of shoes are thrown away each year, and can take 30-40 years to decompose.

More than **\$20 billion** in pairs of shoes are manufactured each year.

Tens of thousands of pounds of new and **unused** parts and raw textiles are thrown out by factories each year.

Every person needs shoes. The footwear industry is one of the largest in the world, and with that insane amount of supply and demand comes many compromises and impacts to the people and the world around us. Many of us lack the knowledge of what happens to our footwear once we've thrown it out or donated it.

Leather/Suede

When it comes to materials, the footwear industry can be incredibly wasteful. Many brands hide behind the mentality that leather is technically a leftover material from the meat industry, yet it still requires significant processing, transportation, and waste to bring leather or suede into a product.

Knit Takeover

At this point, almost every major footwear brand produces some type of knit shoe or shoe component, with Nike and Flyknit leading the pack. The reason for this is incredibly innovative and simple –

Made in America

Making footwear in America is finding a new path as a resurgence in domestic manufacturing is not only trending, but becoming an increasingly important purchase consideration. In fact, the value of shipments for U.S. textiles and apparel was \$74.4 billion in 2016, a nearly 11 percent increase since 2009, according to the National Council of Textile Organizations. Investments in fibers, yarns, fabrics and other non-apparel textile product manufacturing climbed 75% to \$1.7 billion in 2015 from \$960 million in 2009.

Currently, however, there are very few companies that manufacture footwear within the U.S., for not only labor cost reasons, but material supply reasons. Even fewer of them are performance footwear brands, the main one being New Balance, which still does. If a brand is looking to make an all-suede skate shoe, manufacturing in the U.S. is next to impossible, as most of the affordable tanneries and leather supply companies are overseas.



An upper being automatically stitched in a U.S. New Balance facility. This suede upper is a combination of classic footwear materials with a simplified construction, requiring less hands, pieces, and different materials.

Last Development

In footwear, there is a now infamous term of, "the last comes first." In order to develop accurately formed, intentional footwear prototypes and designs, I needed to gain access to shoe lasts. As the project developed, I not only created a last that was based off of the dimensionality that I wanted for an optimal skateboard shoe fit and performance, but I also created ankle height lasts to be able to simulate where the bones and muscles would be coming up the ankle when patterning the sockliner components, as well as higher top-line shoe prototypes.

Base sneaker last

3D scanned and printed base sneaker last

Custom ankle last attempt 1

Custom ankle last attempt 2

3D scanned and printed Serena sneaker last

Serena sneaker last





August 2017
Establishing initial project concepts



Early September 2017
Narrowing project into skateboarding



October 2017
Project research, initial concepts,
development of system

January 2018
Techpacking for MSC trip, location
inspiration and further piece development



February 2018
Insole, upper and outsole
development



March 2018
Textile development, finalizing designs and
models, CAD techpacking and development



April 2018
Producing final models, creating presentation
materials and preparing for BKSS trip.



thank you.

To the professors, industry professionals, peers, friends, and family who helped me learn, grow, and develop this project and my skills as a designer – I could not have done it without you.

Eileen Martinson and the Martinson Fund – Project Sponsorship

Faculty

Mark Sunderland – Project sponsorship and mentor
Todd Kramer – Industrial Design mentor
Tod Corlett – Industrial Design mentor
Marcia Weiss – Textile Mentor
Mark Havens – Industrial Design mentor
Mike Leonard – Project and Industrial Design mentor
Janet Brady – Material Testing mentor
Mikael Avery – ID and OT
Monique Chabot – Occupation Therapy

Manufacturing Solutions Center – Hickory, North Carolina

Rodney Sigmon – Manufacturing Solutions Center
Jason Wilkins – Manufacturing Solutions Center / Innovaknits
Tony Whitener – Manufacturing Solutions Center

Brooklyn ShoeSpace – Brooklyn, New York

Keiko, Yuji, Bonnie, Rebecca

Project Development

Regan Marriner – Masters in Textile Design, B.S. Textile Design
Michael Bielawa – Junior Industrial Design

Material Suppliers and Resources

Derek Wilson – MatPlus
Ronnie Irani – OrthoSole
Matthew Teperow – Vibram
Matt Hennessy – Ortholite
Josh VanDernoot – Cosmo Fabrics

Dr. Pedowitz – Rothman Institute

Skateshops

Woodward Skate Camp
Westside Skateshop – Florida
Nocturnal Skateshop – Philadelphia
Pharmacy Skateshop – California
Union Skate Supplies – Pittsburgh

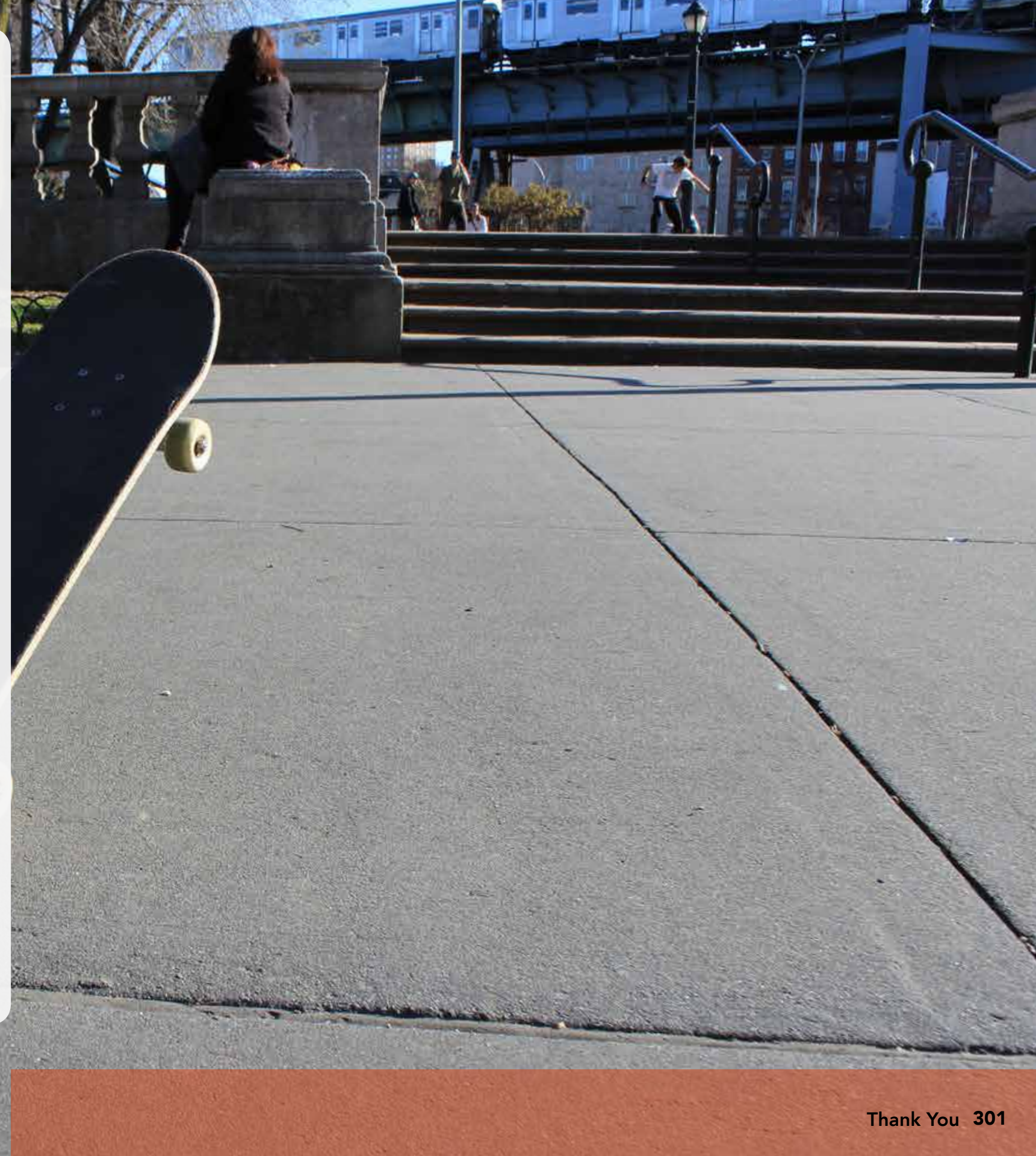
Footwear Design

Nathan VanHook – Nike
Neil Kwiatkowski – Smart Design
Carter Agvent – Cole Haan
Ian Cooke – Footprint Footwear
Matt Flail – Footprint Footwear

Matt Pennington – Clarino Leather
Matthew Burdoff - Ultralon
Matt Beare – The Daily Push
Jeroen Stam – Skateboarding Physio
Nathan Norley – Hologenix, LLC
David O’Keefe – Adv Mat’l Technologies

Gabi Stahley + Paige Graff + Liza Marino

The entire ID Studio Family and program



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Skate Photography: Ben Hull



