BalLin

A footwear collection dedicated for Jeremy Lin

Capstone Project

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SPD 689

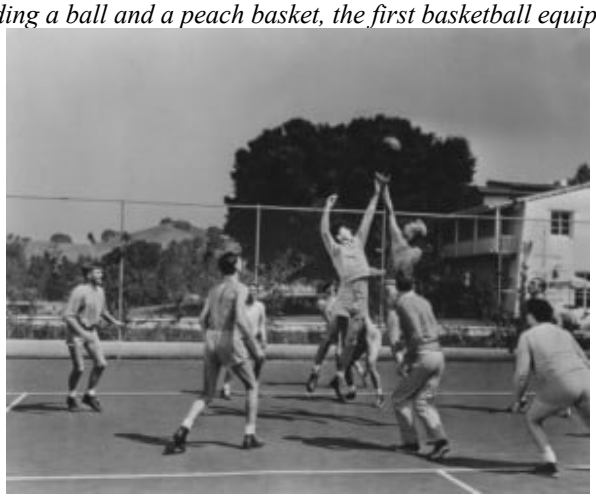
This capstone project is to design a footwear collection with a pair of basketball shoes and a pair of recovery shoes for a former NBA player Jeremy Lin. Due to Jeremy's serious injury history, the goal of this collection is to minimize lower body injuries and improve recovery time.

Basketball history

Basketball was invented in December 1891 by the Canadian clergyman, educator, and physician James Naismith (Logan, 2014). Naismith introduced the game when he was an instructor at the Young Men's Christian Association Training School (now Springfield College) in Springfield, Massachusetts (Logan, 2014). At the request of his superior, Dr. Luther H. Gulick, he organized a vigorous recreation suitable for indoor winter play (Logan, 2014). The game involved elements of American football, soccer, and hockey, and the first ball used was a soccer ball. Teams had nine players, and the goals were wooden peach baskets affixed to the walls (Logan, 2014). By 1897-1898, teams of five became standard (Springfield College, 2015). The game rapidly spread nationwide and to Canada and other parts of the world, played by both

women and men; it also became a popular informal outdoor game. U.S. servicemen in World War II (1939-1945) popularized the sport in many other countries (Springfield College, 2015).

James Naismith
James Naismith holding a ball and a peach basket, the first basketball equipment (Logan, 2014).



A rare photo of a game in progress in the Old Gym (Springfield College, 2015).

As basketball was spreading its name the first international organization FIBA (Fédération Internationale de basketball amateur) in Geneva established as a result basketball first time participated in the Olympic Games as a sport in 1936 and the match was played on a sludge court (Marino, 2020). U.S. national team won the first Olympic title and the runner-up team was from Canada (Marino, 2020).

In the 21st century the most professional basketball league is called NBA (National Basketball Association) but in the early time, its name was BAA (Basketball Association of America) was established on 6th June 1946 in New York City (Marino, 2020).

Basketball shoe history

With countless brands and colors available, it is easy to take today's wide selection of basketball shoes for granted. However, basketball players didn't always have the benefit of choice. In the very early days of basketball, when games were still being played on neighborhood stages before evening dances, there was no such thing as basketball sneakers (Kickz-St, 2017). No company had yet to capitalize on that niche, so various types of footwear adorned players' feet.

Converse All Star "Chuck Taylor" is the oldest, most popular, and all-time best selling basketball shoe of all time (Kickz-St, 2017). It was in 1908 that the Converse Rubber Corporation opened for business (The History of Basketball Shoes, 2019). At first the company only made galoshes and other work related rubber shoes on a seasonal basis (The History of Basketball Shoes, 2019). But eventually the company decided it was more efficient to keep their work force employed and began making athletic shoes. With the popularity of basketball, the Converse Corporation saw the need to develop a shoe that people could wear while playing basketball (The History of Basketball Shoes, 2019). After lots of research and development, the very first version of the All Star basketball shoe was produced in 1917 (Kickz-St, 2017). The All Star shoe originally came in natural brown colors with black trim.

One of the original All Star basketball shoes

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In the 1920s, Converse All Stars were made in all black canvas or leather versions (The History of Basketball Shoes, 2019). In the 1930s Chuck Taylor designed the white high top model for the 1936 Olympics, and the shoe with its patriotic red and blue trim became very popular along with all black canvas and leather models of the All Star (The History of Basketball Shoes, 2019).

The first white model was introduced at the 1936 Olympics

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After World War II, the classic black and white Chuck Taylor All Star High Top was introduced in 1949 (Kickz-St, 2017), a much more eye-catching shoe than the monochrome black models that had been produced up to that time (Kickz-St, 2017).

The classic black and white high top was introduced in 1949.

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The broad history of basketball shoes in the 1960s is also a short one. There was the Converse All-Star in black and there was the Converse All-Star in white (Kickz-St, 2017). That's it. Not before the end of the decade did Converse decide to produce other colorways (Kickz-St, 2017).

Basketball footwear experienced an explosion of diversity in the 1970s (Carroll, 2017). Where only a couple of years before one single shoe ruled the NBA floor, the 70s brought new NBA stars with new basketball shoes (Kickz-St, 2017). Adidas came out with the Superstar, Pro Ked brought the Royal Master, Pony released the Topstar, Nike came out with the Blazer and Puma gave a bright young superstar his own sneaker (Kickz-St, 2017). The Puma Clyde was born (Kickz-St, 2017).

In the 1980's, Nike introduced the Air Force 1 which has an air sole and a classic leather design (Carroll, 2017). Michael Jordan stepped into the NBA spotlight in the 1980s and changed basketball forever (Carroll, 2017). Not only did his style of play revolutionize the game, an unprecedented mix of a unique smoothness and elegance combined with an inhuman athlecticism and relentless abandon, MJ's shoes did too (Kickz-St, 2017).

The 2000's opened its doors to super lightweight and high-tech basketball shoes (Kickz-St, 2017).

Today, the improvements in performance and function associated with basketball shoes have not led to any apparent decreases in injury rates among players, even at the professional level (Carroll, 2017). Several confounding factors make it difficult to determine statistical associations between footwear and injuries in basketball, but attitudes toward shoes among National Basketball Association (NBA) players suggest both positive and negative trends with regard to potential injury risk (Kickz-St, 2017). Many players' shoe preferences tend to be dictated by fashion, which can create fitting challenges that could potentially increase injury risks (Carroll, 2017). On the other hand, many players also place a premium on comfort—in relation to both the design of a shoe and the way it is worn—which could help reduce those risks (Carroll, 2017).

Athlete

Jeremy Shu-How Lin (born August 23, 1988) is a professional basketball player who last played for the Beijing Ducks of the Chinese Basketball Association (CBA) (Wikipedia, 2020). Lin unexpectedly led a winning turnaround with the New York Knicks of the National Basketball Association (NBA) during the 2011–12 season, generating a cultural phenomenon known as "Linsanity" (Wikipedia, 2020). Lin was the first American of Chinese or Taiwanese descent to play in the NBA, and he is one of the few Asian Americans to have played in the league (Wikipedia, 2020). He was the first Asian American to win an NBA championship, having done so with the Toronto Raptors in 2019 (Wikipedia, 2020).

Athletes data & market size

Revenue in the Athletic Footwear segment is projected to reach US$14,106m in 2020 (Blasi, 2020). The market is expected to grow annually by 5.4% (CAGR 2020-2025). (Athletic Footwear, 2020) Today, ever since basketball became a worldwide sport, basketball shoes have

become a multi-billion-dollar international business (Kickz-St, 2017). However, basketball shoe sales now represent less than 4% of the athletic shoe market, a massive drop from their 13% market share in 2014, according to data from research firm NPD (Kickz-St, 2017). In addition, basketball performance shoe sales are also down roughly 13% compared to the same period a year ago, the fourth consecutive year that aggregate basketball shoe sales have declined (Blasi, 2020).

Jeremy Lin has 1.9m followers on Instagram, 3.4m followers on Facebook, 2.5m followers on Twitter and 7.3m followers on Weibo (data from social media).

An estimated 300 million Chinese citizens play basketball (Li, 2017) — roughly equivalent to the entire population of the United States, according to the Chinese Basketball Association. It is the most popular sport among Chinese youth (Li, 2017).

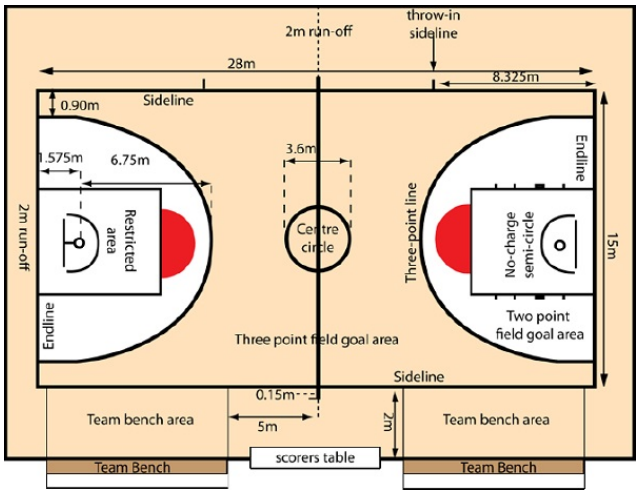
Athletes positions

Jeremy Lin is a point guard in most of his basketball career. He also played as a shooting guard on the court sometimes. The Point Guard is usually the shortest but the best ball handler on the team. Also known as the 'coach on the floor' or the 'floor general', a point guard is responsible for directing plays. He needs to have good court vision to create open shots for the receivers as well as drive the ball down the court and initiate offensive plays. Point Guards need to have an excellent long-distance shooting, though it's not quite as crucial as for shooting guards, some point guards take as many shots as shooting guards (Basketball Positions and Roles, 2020).

Environment

Jeremy Lin as a professional basketball player, that always play on indoor court. A standard international basketball court is an indoor, rectangular court with dimensions 50 feet ×

94 feet (Basketball - Playing Environmen, 2020). The court is divided into two symmetrical halves, one for each team. Various markings are painted on the court. There's a circle at the center, free throw semi circles, restricted areas and three-point lines are marked on either side of the court (Basketball - Playing Environmen, 2020). A no charge semi-circular area is marked just below the basket (Basketball - Playing Environmen, 2020).



basketball court

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Rules

Basketball game played between two teams of five players each on a rectangular court, usually indoors. Each team tries to score by tossing the ball through the opponent's goal, an elevated horizontal hoop and net called a basket (Logan, 2014).

A successful field goal attempt from the area inside the three-point line shall count two points. A successful field goal attempt from the area outside of the three-point line shall count three points. A successful free throw attempt counts one point. An NBA game has four regulation play periods. Each period will be twelve minutes long. The team that scores the most points wins the game (Rule, 2019).

For much of the NBA's 72-year history, footwear worn by all of its players has gone through a series of varying restrictions (DePaula, 2018). Historically, all sneakers on a team were restricted to being either 51 percent white or black, plus a minimal team color accent, depending on which team was hosting or visiting (DePaula, 2018).

During the 1984-85 season, Michael Jordan famously received a warning letter effectively banning his black-and-red Air Jordan 1 sneakers (DePaula, 2018). Nike turned the ordeal into a marketing campaign for his debut signature shoe and never looked back. The Jordan Brand now reaches $3 billion annually in revenue (DePaula, 2018).

By the late 2000s, shoes in full team colors were allowed leaguewide, meaning Bulls players could wear all red shoes or the Boston Celtics could wear all green, in addition to white or black (DePaula, 2018). In 2012, the league added "theme nights" to its schedule, working in tandem with a variety of sneaker companies to create storytelling shoes for holidays and other moments such as Christmas, Veterans Day and Black History Month. During the NBA Finals and on a team's championship ring night to start the season, gold-accented sneakers also were allowed (DePaula, 2018). In all, 10 sneaker theme nights throughout the season were slated for recent regular-season schedules (DePaula, 2018).

As players have continued to ramp up their penchant for wearing flashy sneakers all season, the league is looking to offer up some additional freedom. Last season, LeBron James wore 51 different versions of his Nike LeBron 15 model (DePaula, 2018).

The only ongoing restrictions will regard third-party logos, which still will have to be preapproved by the league office before making their way to the court (DePaula, 2018). Custom hand-painted sneakers, often made just days before being worn, surged in popularity last season (DePaula, 2018). The league will continue to look closely at any third-party logos, as last season

saw everything from nonapproved movie cover artwork to podcast logos to charity organization icons sneak onto the hardwood (DePaula, 2018).

Athlete introduction

Jeremy Lin is an Asian American professional basketball player who played 9 years as a point guard in NBA. In August 2019, he left the NBA and signed with the Beijing Ducks. After one season in China, he came back to the states and joined Santa Cruz warriors of the nba g league and keep chasing his nba dream. Jeremy lin is also regarded as a fashion icon off court. He joined **Coach** brand as one of the ambassadors. He appeared on some fashion magazines cover like GQ, also known for his different haircut.

Injury history

Jeremy's most serious injury in his NBA career is the ruptured patella tendon of the right knee in the 2017-2018 NBA season (Maniego, 2017). In the fourth quarter of that game against Indiana Pacer, Jeremy went up for a contested layup and landed awkwardly before reaching for his right knee while he was on the ground. He grabbed his right knee, his mouth gaping in shock, and shook his head as if he couldn't believe it (Maniego, 2017). Then he started to cry. He missed the entire season due to this knee injury (Maniego, 2017).

Patellar tendon rupture is a rupture of the tendon that connects the patella to the tibia. The patellar tendon is the terminal extension of the quadriceps muscle in the leg (SportsMD, 2020). The four muscles that make up the quadriceps each provide a tendon that attaches to the kneecap (patella). The patella essentially lies within the quadriceps tendon and is therefore called a "sesamoid" bone (Maniego, 2017). The quadriceps tendon becomes thicker and narrower as it travels from the kneecap to the shin bone (tibia) (Maniego, 2017). This thicker and somewhat narrower tendon is called the patellar tendon because it starts at the patella and ends at the tibia (SportsMD, 2020).

Jeremy Lin also had some recurrent injury history, which is Hamstring sprain and ankle sprain. He missed 43 games due to the recurrence of the hamstring (Maniego, 2017).

Season	Team	Date	Injury	Games Missed
2011-2012	New York Knicks	30 March 2012	Partial left meniscus tear (surgery)	17 regular season 5 playoff
2012-2013	Houston Rockets	24 April 2013	Chest contusion	2 playoff
2013-2014	Houston Rockets	27 November 2013	Bruised knee	6 regular season
2013-2014	Houston Rockets	15 December 2013	Back spasms	4 regular season
2014-2015	Los Angeles Lakers	28 March 2015	Upper respiratory infection	2 regular season
2014-2015	Los Angeles Lakers	8 April 2015	Left knee soreness	6 regular season
2015-2016	Charlotte Hornets	28 December 2015	Ankle sprain	2 regular season
2015-2016	Charlotte Hornets	27 January 2016	Ankle sprain	1 regular season
2015-2016	Charlotte Hornets	29 March 2016	Back tightness	1 regular season
2016-2017	Brooklyn Nets	2 November 2016	Hamstring sprain	16 regular season
2016-2017	Brooklyn Nets	14 December 2016	Back tightness	1 regular season
2016-2017	Brooklyn Nets	26 December 2016	Hamstring sprain	27 regular season
2016-2017	Brooklyn Nets	19 March 2017	Right ankle sprain	1 regular season

. Jeremy's injury history from 2011 to 2017. (Maniego, 2017)

Hamstring injuries account for 29% of all athletic injuries, according to a study by Columbia University's Department of Orthopedic Surgery (Okoroha, 2019). Of course, that accounts for every sport, not just basketball. A 2015 article in the British Journal of Sports Medicine, reported that hamstring injuries have increased by 4% annually in men's professional football (Okoroha, 2019). Measurements were taken over a 13-year period. The study noted that hamstring injuries occurred most often during training (Okoroha, 2019).

The Columbia University study also found that re-injury risk was between 12-31% (Maniego, C, 2017). While only a strain, and not a complete tear, every hamstring injury must be treated carefully. While athletes may feel ready to perform after a few weeks, the strain may linger. Both rest and recovery should be emphasized, especially after periods of inactivity (Maniego, C, 2017).

More than 30% of the players who suffered from ankle sprains had chronic ankle instability (Ryan, 1994), which would result in repeated ankle sprain that affects not only their athletic

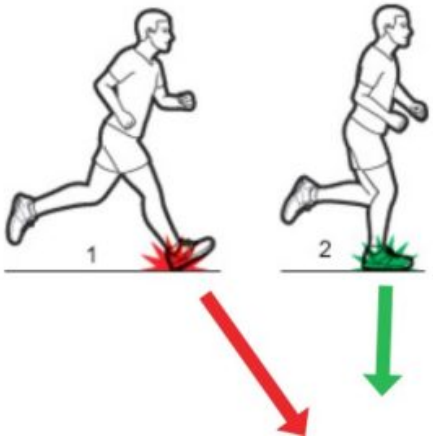
performance but also daily functional activities (Willems, Witvrouw, Verstuyft, Vaes, & De Clercq, 2002).

Athlete biomechanical needs

It is necessary and important to have biomechanical study on why Jeremy Lin was prone to repetitive injuries.

Sure you can recover from the injury and rehab the associated area, but ultimately, there is a certain part of your body which is being stressed far too much. Simply going back to playing the way you were, at the same intensity, will inevitably lead to further issues down the line. Rehabilitation exercises, if successful and well implemented, will delay this, but they won't fully protect you (Warond, 2017).

Based on reviewing Jeremy Lin's previous game, I noticed that he was really overstriding with his legs (when your muscles and tendons are overstretching or overextending, they are particularly weak and prone to injuries) (Warond, 2017) and also he was landing on his heels.



When you run on any surface, especially one as uncompromising as the hardwood, you will inevitably place a considerable amount of stress on your joints (Warond, 2017). Although this is not always the case, more stress can often lead to more injuries (Warond, 2017). Having

good running mechanics is largely related to running in a way which is not only efficient and effective but also safe and durable (Warond, 2017).

The way in which players will land on their feet whilst running tells us a lot about their running form. If you land on your heels, due to overpronation of the feet, you are placing a much larger strain on your lower joints than if you were a midfoot or forefoot striker (Warond, 2017). Your heavy heels cause you to make a larger impact with the ground, a force which reverberates through your body. This force also lasts longer when you strike with your heel as your foot needs to take the time to roll through into a push-off position. These sorts of shear forces have been shown to lead to bone fatigue, something which can really damage your knees.

So Jeremy Lin doesn't have great running biomechanics, and this mixed with his previously-explosive style could largely explain why he was prone to injuries.

Shoe modifications are suggested to reduce the risks of injuries and improve sports performance in basketball (Lam, 2019). "Effect of shoe modifications on biomechanical changes in basketball" is a systematic review aimed to critically evaluate the effect of different basketball shoe modifications on biomechanical changes in basketball movements (Lam, 2019). The results were categorized based on the following shoe modifications: (a) cushioning, (b) midsole hardness, (c) collar height, (d) outsole traction component, (e) forefoot bending stiffness and (f) shoe mass that influence lower limb biomechanics (Lam, 2019). The included articles revealed that 1) better shoe cushioning or softer midsole is related to better impact attenuation in passive/unanticipated situations (Lam, 2019), 2) high shoe collars are effective to improve ankle stability in jumping and cutting tasks (Lam, 2019), 3) increased shoe traction and forefoot

bending stiffness can improve basketball jump, sprint and/or cut performances (Lam, 2019) and 4) lighter shoe mass results in better jump and/or cut performances when the shoe mass is known (Lam, 2019).

Based on Jeremy's serious knee injury history, shoes should have great cushioning for better impact attenuation in passive/unanticipated situations for example awkwardly landing (Lam, 2019). Based on his recurrent ankle sprain, shoes should have higher collars for better ankle protection (Lam, 2019). Based on his playing style (a lot of sprint, dribble, cross over), shoes should have less weight to improve his jump & cut performance (Lam, 2019).

After reviewing Jeremy Lin's injury replays, most of his injuries were caused by awkwardly landing. It is necessary to have a biomechanical study on landing mechanics.

There are two main reasons for focusing on how athletes land: injury prevention and power production (Mitch, 2020). Not only for Jeremy Lin, but both factors are also equally important for athletes of all ages, levels, and positions. It is helpful to find the solution of designing the shoes to prevent or decrease the possibility of unsafe landing as well.

All athletes expose themselves to lower body injuries ranging from ankle sprains to low back pain; osteoarthritis to fractures; and probably the most feared, the ACL tear (Mitch, 2020). Recurrent hard landings will lead to premature wear and degeneration of the ankle, knee, and hip joints. These frequent jolts of the lower extremity transfer force up the kinetic chain at a rate much higher than that which the body normally experiences during activity. Learning to land softly, without noise and slowly decelerating the weight of the body will significantly lower the impact forces, decrease the risk of injury, and extend the life of joints (Mitch, 2020).

The other major concern related to poor landing techniques is the ACL tear. The most common position for an athlete tearing the ACL is foot pronation, tibial internal rotation, and a

valgus position of the knee. In other words, the foot flattens out, and the lower leg rotates inward, while the knee collapses towards the body's midline (Mitch, 2020).

Flat feet

Jeremy Lin is extremely flat-footed. He talked about that He can't hike due to this reason. Having flat feet, a condition referred to as pes planus or fallen arches, is rarely serious, but can cause pain when you do extensive physical activity (peninsula pod, 2016). If you have flat feet, your feet don't have a normal arch when you are standing (peninsula pod, 2016). The 2012 National Foot Health Assessment showed that 8 percent of adults in the United States ages 21 and older have flat feet (Chitra, 2019). Another 4 percent have fallen arches (Chitra, 2019).

Adults can develop flat feet through injury, tight Achilles tendon, abnormal joint formation, continued stresses on the foot and its arch, or simply as they age (Advanced foot & ankle care center, 2018).

However, most of the basketball shoes in the current market were designed for people with a normal arch. I can't find any shoes specifically designed for flat-footed people. So wearing the wrong shoes is another reason explained why he always got injured.

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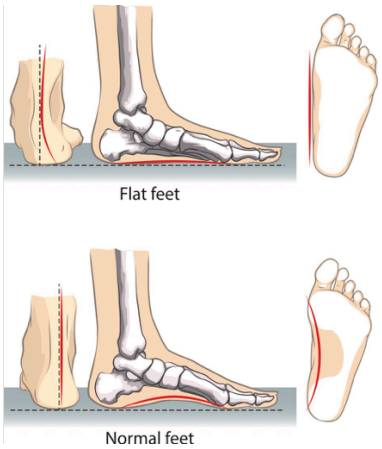


Materials

Upper

Cow leather was the most common material used for making basketball shoes. It is durable, flexible, stretchable, and is available in many styles, colors, and price points. But leather does have some drawbacks. It can be heavy, hot, and susceptible to water absorption and damage if not treated. Water-resistant and water-proof treatments add cost. Leather is a relatively expensive material when compared to fabric or other human-made materials and must be treated with care during shoe manufacturing (Motawi, 2017).

Textiles for shoes come in a huge variety of colors, weaves, knits, fibers, and deniers. Denier is how thread weight is measured. 1 denier = 1 gram per 9000 meters of thread. Typical denier is 110D for very lightweight fabric, 420D and 600D are common thread weights for shoe fabrics. Footwear textiles come in many fiber types including cotton, wool, nylon, polyester, polypropylene, rayon, lycra and more. Each has its own look and physical properties (Motawi, 2017).

Synthetic leather is a layered composite made by coating a polyurethane paste onto a fabric substrate (Ritter, 2014). Most synthetic leather manufacturers use cotton or polyester as

the base material for their fabrics (Hodakel 2019). Then, bind PU or PVC to the underlying base textiles, a variety of processes may be used, but they generally involve melting the plastic and overlaying it on the base textile. Once the plastic has been bound to the underlying fabric, it is cut into the desired shape and size (Hodakel 2019). These human-made materials are often a composite made of two layers. A backing layer, made of woven or non-woven polyester fibers. Combined with an external surface layer by "dry" lamination process or by liquid "wet" processes. Many of the least expensive synthetics have a fibrous woven backing with PVC skin made by a wet process. The surface on these may not be 100% smooth, and the shoe will show wrinkles and creases (Motawi, 2017).

Mesh refers to a knitted structure of fibers and is technically a barrier created from connected strands. The yarns are knitted or woven together, resulting in a fabric with open spaces in between the strands of yarn. When it comes to mesh fabric, the material is typically made from polyester or nylon. The synthetic fibres are woven to create a flexible, net-like fabric which has a huge range of uses. Contrasting to this, mesh can also be created from metals for a sturdier and more structured material, often for industrial use (Carbonell, 2013).

Midsole

Midsoles of shoes are all made from closed cell foam. Midsole foam is covered in the article Outsole Design. Common closed-cell foams include EVA (ethyl vinyl acetate), PE (Polyethylene), SBR (Styrene-butadiene rubber), PU (Polyurethane), Latex, and Neoprene. Each has its own properties. EVA foam is used for backing mesh materials, and 2mm sheet EVA will make fabric waterproof. Neoprene and SBR are used when elastic properties are required. Latex is common for collar linings. PE foam is very light but not too durable, so its use is limited (Motawi, 2017).

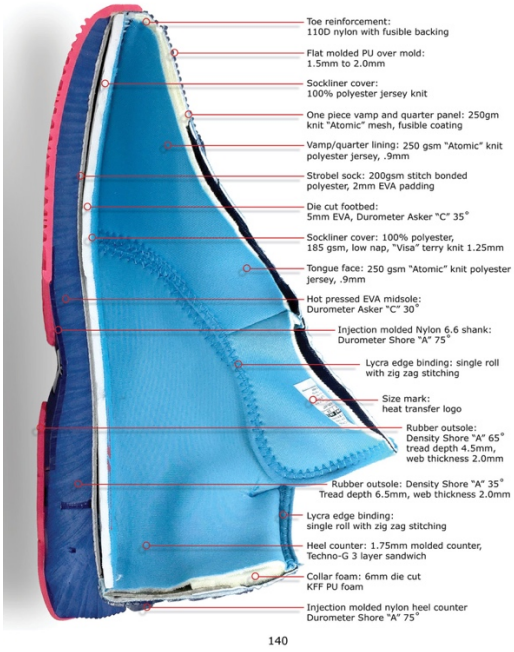


Figure 8. Basketball shoe material call-out

Retrieved from https://www.sneakerfactory.net/2020/04/how-to-pick-sneaker-materials/

Manufacturing

Currently, most of sports manufacturers make basketball shoes with the following method First, the upper part. The upper pattern parts for the shoe are made into steel cutting dies. Each upper part is cut from rolls of fabric or from leather hides (Motawi, 2017). Today more and more sports footwear companies use 4D knitting construction to make upper which is produced by a CNC knitting machine then assembled with the tongue, lining materials, and reinforcements (Schmelzeisen, Koch, Pastore, & Gries, 2018).

Next, stitch the parts of the upper and sewing them together. The shoes upper is prepared with the strobel bottom. The shoe upper is steamed to soften the materials and the last is inserted and pulled tight. While the upper is being lasted, the sole is being prepared. In the throwing shoe area, rubber sole is commonly used and it usually combines with the foam cushioning component cemented inside (Motawi, 2017).

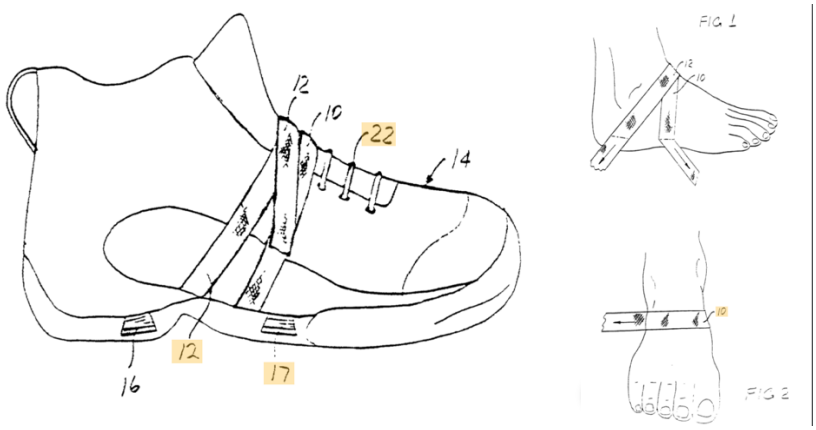
When the upper has lasted tightly and the outside unit is competing, the two pieces come together. Then, the rubber sole unit will receive coatings of primer and cement. The outsole will get its own special primer. The shoe upper is also prepared with its own special primer and cement (Motawi, 2017).

After the contact cement and primer have been completely dried in the heating tunnels, the two pieces are joined together by hand. A skilled shoe maker aligns the upper and outsole together then places the shoe in a hydraulic press (Schmelzeisen, Koch, Pastore, & Gries, 2018). Once the shoe is pressed together it's often put in the cooling tunnel to set the glue. After the cooling tunnel, a shoe de-lasting machine is used to push the last out of the shoe without wrinkling the shoe upper (Motawi, 2017).

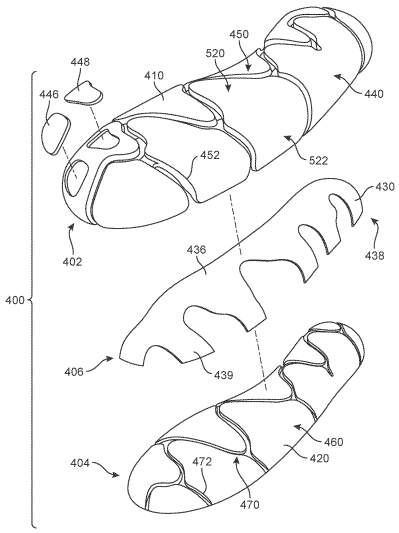
Intellectual property

Due to Jeremy Lin' serious injury history and playing style (a lot of dribble and direction changing), the basketball shoe of this collection will be focusing on cushioning stability and traction, so it is necessary to study patents in the relevant area for reference.

US20020088144A1 basketball shoe with stabilization device

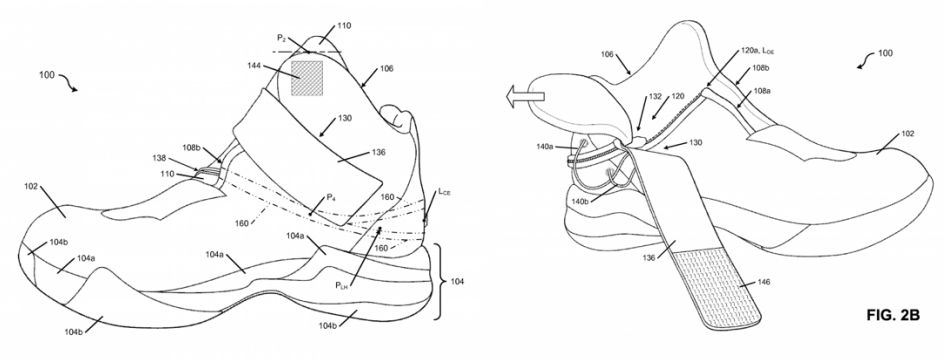


US10765170 basketball shoe adaptive fit outsole



(Langvin,2018)

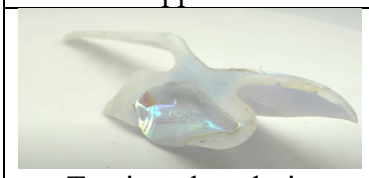
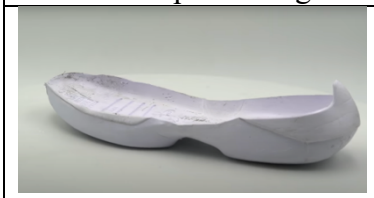
USD884324 basketball shoe opening system



(Tobie, 2017)

SWOT Analysis of Levitation 4 (the basketball shoe Jeremy Lin is wearing)

	Strength	Weakness	Opportunity	Threat

 Silhouette	Low top, match Jeremy's quick playing style	Not an iconic silhouette	More detail elements about Jeremy Lin	Low brand recognition
 Color & Graphic	• Clean colorway • Iridescent TPU color	Not a good idea for outdoor use	Bold Jeremy Lin Logo	Kind like Adidas D rose 7 white Christmas colorway
 Upper material	Fuse toe box reinforcement	• Poor ventilation • Too heavy (498 g)	• Remove elastic strap and pull tab to decrease weight • Add perforations on tongue	Cheap plastic feeling at forefoot
 Upper fit	Overall fit ok	Feet sliding off when doing cut	thicker padding on heel to have better lock down	Not snug enough on toe area for narrow feet
 Torsion plate design	Great lateral stability	No arch support, not good for high arch feet	Carbon fiber instead of TPU, more lightweight and rigid	Kind like the eclipse plate on Jordan 34
 Midsole material & thickness	• Good Heel to toe transition • Great impact protection	Too thick on heel, bad court feel	Dual density on forefoot and heel	Normal EVA, doesn't have a technology name like "react", "boost"
 Outsole traction	Herringbone pattern Great grip on rough surface	Rubber compound pick up a lot of dust	Multi-direction pattern will maximize variable traction	Not durable for outdoor use

 Sock liner	Thick sock liner provides extra cushioning	Poor breathability and court feel	Add perforations on forefoot	No arch support

Benchmark products

After having spent time with Nike and adidas in the NBA, Jeremy Lin got an endorsement deal from China's third-largest home-grown sports brand, Xtep last year. The brand is widely known for its running products but is pursuing more of the local basketball market share (Xtep, 2019).

Jeremy Lin's personal logo was designed by his father during his rookie NBA season. This logo uses the initials of his name(J and L) and the jersey number & at that time. At the same time this logo symbolizes a pair of feet walking on the water. This logo shows Jeremy relies on effort and confidence to create energy and miracle, also interprets his firm belief. I will apply this logo in my design.

Basketball Shoe

Xtep Levitation 4

Retail Price: $99

The mid-cut model is constructed in mesh, and is paired with TPU overlays, a J-Lin logo on the lateral metallic iridescent finishes on the midsole and heel pull. The pair also features a midfoot plate for support and stability.

However, based on the performance review from the No.1 shoes, athletics apparel, and sporting goods review site WearTester, Xtep Levitation 4 still has some disappointing aspects.

It features herringbone throughout the outsole but the grooves are closely-spaced together, allowing for dust and other debris to accumulate. The rubber is also fairly pliable as the medial sides of the outsole have already begun fraying (Jarrod, 2020). It's a heavy sneaker and feels like most of the weight is due to the cushion. Because of that, it feels like you sit high off the ground which is not stable enough. There is an elastic band on the forefoot and a plastic heel clip on the heel that doesn't really do anything but look cool. Last, the torsion plate is connected to the TPU that goes up the lateral side of the sneaker. That, combined with the outrigger, prevents your ankle from rolling over and the fuse on the upper does a solid job of keeping your foot contained. However, the TPU on the lateral side kept digging at the sides at the start of every session (Jarrod, 2020).

I will keep those feedback of this shoe in mind and be better with my new design.

Lifestyle Shoe

Adidas Originals Pro Model

Retail: $90

The adidas Originals Pro Model brings classic old-school style to the court and to the street. Although this classic shell toe and 3-Stripes® style remains the same as the original, this next generation of the adidas Pro Model has been infused with technology to bring it up to the high standards of today's modern game.

Competitor product

Basketball shoe

Overall: Currently in NBA, 63% of players choose to wear Nike (72% if include Jordan Brand), 16% of the players wear adidas and that leaves just 12% for other brands (Under Armour, Puma, Li-Ning, etc) (Gallinger, 2019).

I picked four shoes as competitor products from Nike, Jordan Brand, Adidas and Under Armour and each shoe was designed for an NBA player who plays the same position which is point guard as Jeremy Lin. Photos from footlocker (footlocker.com).

Nike Kyrie 6

Retail Price: $130

Nike Kyrie 6 features large swoosh adds an important style element to the side, engineered leather and mesh upper allows the foot to breathe while providing a slick style. Thick midfoot strap holds the top of the foot securely in place. Midsole traction to keep you on your feet and your competition on their toes.

AIR JORDAN "WHY NOT?" ZER0.3

Retail Price: $130

Jordan Why Not Zer0.3 features built-in technology adds support throughout the cushioned sole. Breathable synthetic upper exterior maintains ventilation. Zoom Air unit in the forefoot offers superior comfort and rubber outsole gives you durable traction.

ADIDAS DAME 6

Retail Price: $110

Adidas Dame 6 features Webbed lacing system for snug feel. Super-light Lightstrike cushioning and textile upper.

Under Armour Curry 7

Retail Price: $140

Under Armour Curry 7 features layering of synthetic leather, lightweight mesh, and TPU skins for a combination of ventilation and support. Foam padding in the collar and heel provide comfort. Internal counter sleeve offers

comfort with no break-in needed. UA HOVR technology provides responsive cushioning with every step.

Lifestyle shoe

Nike Blazer High

Retail Price: $100

The Nike Blazer High casual shoe features a high-cut style for plenty of ankle support and a rubber outsole for supreme traction on multiple surfaces. Premium leather upper and EVA midsole for comfort. Cut flex grooves deliver added flexibility.

Vans Sk8 Hi

Retail Price: $70

The Vans Sk8-Hi features a sturdy canvas and suede upper that makes it a canvas classic. Padded collars add support and comfort, while the enforced toecaps help these kicks withstand repeated wear and tear.

Converse Pro Leather Hi

Retail Price: $75

The Converse Pro Leather features a durable suede upper with leather detailing and perforations for added breathability. This sits on a rubber outsole that offers traction and a solid base to get you through your day in style.

Adidas Originals Top Ten Hi

Retail price: $90

adidas Originals Top Ten Hifeatures the famous Three-Stripes with a perforated, full-grain leather upper, suede toe guard, and stamped adidas and Trefoil logos on the outsole. It also sports a herringbone cupsole for traction and a padded tongue with the Top Ten logo.

Graphics & color &logo

Basketball shoe

More and more of the graphics on the upper of basketball shoes are patterns created by knitting, utilizing different color & material yarns. The graphic and logo are made from generally minimalistic geometries. There is a trend to use computer generative patterns on the sidewall and outsole design. Even though this is the most primitive application of generative design, it does make the communication and revising process much easier when designing in a team. The color trend in basketball shoes have not changed much through the years. Most styles in the market will have one safest colorway that shows in most promotions. This colorway usually has a neutral base color with some bright accent color that is relevant to the story behind the design or the team that the player is currently playing for. Other than the main colorway, there will usually be a few colorways inspired by the player's personal stories or favorite tv show, or collaboration with other brands. These colorways can be very bold and fresh, which is commonly preferred by basketball players. The 4D knitting technology allows more colored threads to be shown on one upper which encouraged the trend of multi-color knit pattern. Another trend is to combine different materials to give different locations of the upper different function as well as create a layered look.

Lifestyle shoe

Performance Research Planning

benchmark product data: Xtep Levitation 4 (US 11)

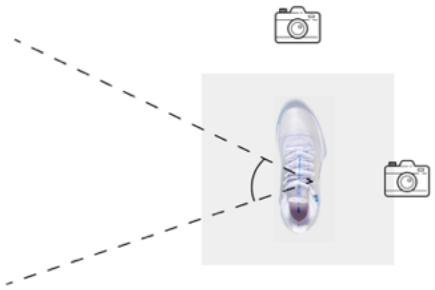
Overall weight	535 g	Poor
Upper weight	185 g	Poor
Tooling weight	304 g	Average
Sockliner weight	27 g	Good
Forefoot thickness	19.4 mm	Average
Heel thickness	30.57 mm	Average
Upper deformation	10%	Great
Midsole compress	20%	Average

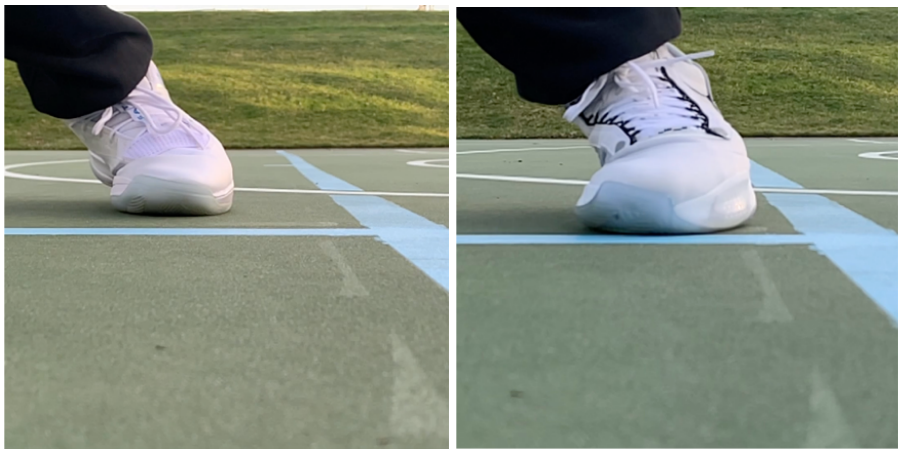
Goal: this research will offer insights into upper support, midsole thickness & hardness and torsion plate stiffness on my benchmark product Levitation 4, as well as how these qualities affect user perception in order to understand a base level where I need to improve them.

upper support test:

Phase of Study	Procedure	Data collected	Timing
Find participant to conduct benchmark product wear testing	Send email / text to people who has similar injury history with Jeremy Lin	• Participant name • Shoe size • Foot type • Playing style • Position	NA
Pick testing location and set up testing date and time	Talk with participant before the test	Get initial insight from he about the benchmark product	10 minutes
Pick a spot on the court as force platform	Set 2 cameras near the force platform (one sideview and one front view)	NA	5 minutes
Have participant try on the Xtep shoe	Ask participant how he feels about this Xtep shoe	Comfort score of Xtep shoe	2 minutes

45° sidestep cutting task with Xtep shoe	Participant had maximum speed approach run of 7 m, followed by the right-footed landing on the force platform and a change in direction of 45° towards the left	• Toe area deformation of the Xtep shoe captured by the front view camera • Lateral side of upper deformation captured by the side view camera	3 minutes
Have participant switch to the Jordan shoe	Ask participant how he feels about this Jordan shoe	Comfort score of Jordan shoe	2 minutes
45° sidestep cutting task with Jordan shoe	Participant had maximum speed approach run of 7 m, followed by the right-footed landing on the force platform and a change in direction of 45° towards the left	• Toe area deformation of the Jordan shoe captured by the front view camera • Lateral side of upper deformation captured by the side view camera	3 minutes
Analyze upper deformation data	Observe upper deformation via slow motion replay from 2 camera	Upper deformation percentage	10 minutes
Get result	Compare upper deformation percentage of 2 shoes	Upper support score of 2 shoes	5 minutes
Full court game task	• Participant play full court basketball game in Xtep shoe • Participant play full court basketball game in Jordan shoe	overall upper support ranking of 2 shoes	15 minutes each





upper deformation on lateral side

upper deformation on medial side

maximum rollover angle

The result is that Xtep shoe has great lateral upper support, but the medial support, which is the arch support, is too much for flat-footed players. Both of the participants also mentioned

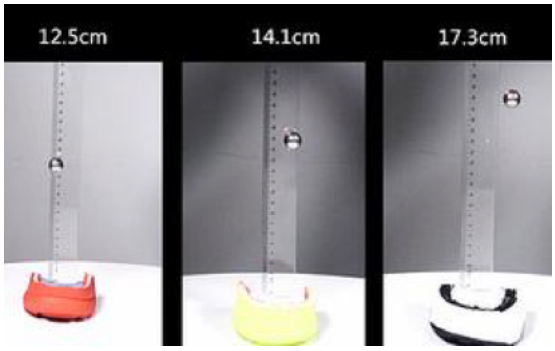
that the Xtep shoe was too heavy for guards like Jeremy Lin who need to run a lot during the game.

So based on this test, there are 2 things I can improve on that Xtep basketball shoe, one is the arch support, the other is upper support without scarificing weight.

Midsole cushioning test:

Vertical jump task preparation	Pick a spot on the court and set camera side view of the court	NA	5 minutes
Vertical jump task with Xtep shoe	• Have participant wear the Xtep shoe and perform vertical jump 3 times • Participant land with forefoot, heel and whole foot each time • observe how much the midsole compress while landing to the ground via slow motion replay	• Forefoot compress rate • Heel compress rate • midsole compress rate	3 minutes
Vertical jump task with Jordan shoe	• Have participant wear the Jordan shoe and perform vertical jump 3 times • Participant land with forefoot, heel and whole foot each time • observe how much the midsole compress while landing to the ground	• Forefoot compress rate • Heel compress rate • midsole compress rate	3 minutes
Midsole cushioning comparison	• compare forefoot compress rate with heel compress rate of Xtep shoe	Overall midsole cushioning ranking of 2 shoes	5 minutes

	• compare midsole compress rate of 2 shoes		
Midsole rebound task preparation	• Set a camera from view and put a rule in the back • deconstruct 2 shoes and measure the thickness of midsole	• Forefoot thickness of midsole • heel thickness of midsole	30 minutes
Midsole rebound task	• a steel bearing ball being dropped onto the heel & forefoot midsole of 2 shoes from a height of 100 cm • bearing ball rebound height is captured by the camera and measured by the rule	• Steel bearing ball rebound height • midsole rebound rate of 2 shoes	5 minutes



TORSION PLATE STIFFNESS

Bending task	• bend Xtep shoe at midfoot and rank the stiffness from 1 to 5 • bend Jordan shoe at midfoot and rank the stiffness from 1 to 5	• Torsion plate bending stiffness ranking of Xtep shoe • Torsion plate bending stiffness ranking of Jordan shoe	5 minutes

Twisting task	• twist Xtep shoe at midfoot and rank the stiffness from 1 to 5 • twist Jordan shoe at midfoot and rank the stiffness from 1 to 5	Torsion plate twisting stiffness ranking of Xtep shoe • Torsion plate twisting stiffness ranking of Jordan shoe	5 minutes

	Torsion plate material	Bending resistance	Twisting resistance
Xtep Levitation 4	TPU	8	7
Lining Yushuai 13	Carbon fiber	10	9
Nike Hyperrev 2016	NA	5	5

Consumer Research Planning

Goal: This research will collect data via survey from people who did video review on my benchmark products in order to identify the opportunities for product improvement

For consumer research, I had a question set for both of my basketball and lifestyle benchmark shoes. I reached out and sent questions to people who upload performance review of the xtep levitation 4 and unboxing videos of adidas pro model on youtube, becasue they have these shoes in hand , and they tested a lot of shoes, they can compare them with other shoes, so I feel like their feedback and ranking socre will be useful reference. Then I drew this radar chart based on the average score of each part of the shoe from those people and got the overall score. The 2 most dissatisfying parts are weight and breathability, so I need to have a better solution on these part in my design

Basketball shoe question set

1 What's your first impression of Levitation 4 visually?

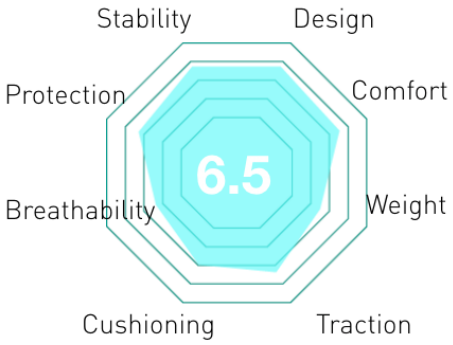
2 What’s your first impression of Levitation 4 when you wear them?

3 Do you feel protected wearing this shoe while doing (cutting, spinning, side step etc)?

4 How can this shoe perform better for Jeremy?

5 If you can design a basketball shoe for Jeremy Lin, what will it be like?

6 Rank the stability, protection, breathability … of this shoe from 1 to 5



DGHOOPS

Sneaks & Feet

Sneaks & Feet

Kicks Vision

XCin

FC

	DGHOOPS	Sneaks & Feet 1	Sneaks & Feet 2	Kicks Vision	XCin	FC
Stability	8	7	7	6	8	7
Protection	7	7	6	6	8	7

Breathability	5	4	5	4	5	6
Cushioning	6	6	5	7	6	6
Traction	7	8	7	7	7	8
Weight	5	6	5	4	5	6
Comfort	7	8	7	7	8	7
Design	8	8	9	7	8	7

Lifestyle shoe question set

1 What's your first impression of Adidas Pro Model visually?

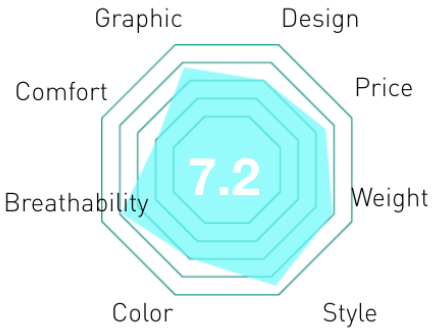
2 What's your first impression of Adidas Pro Model when you wear them?

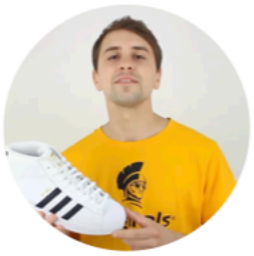
3 Do you think this shoe match with Jeremy's off court style?

4 Are them easy to match with your daily outfit? Rank from 1 to 5

5 If you can design a casual shoe for Jeremy Lin, what will it be like?

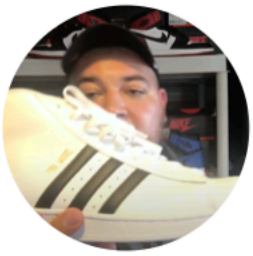
6 Rank the design, style, color, graphic… of this shoe from 1 to 5





Originals

Shop Zappos



nickskicks35

Cosmos Sport

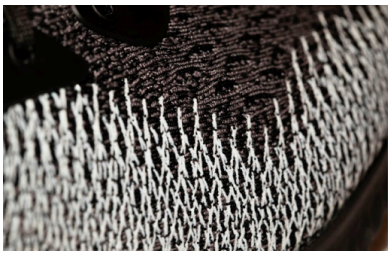
RonRon

Robert Smart

	Originals	Shop Zappos	nickskicks35	Cosmos Sport	RonRon	Robert Smart
Color	9	8	8	6	8	7
Graphic	6	7	7	6	6	7
Trend	7	7	6	4	5	6
Price	9	8	10	7	7	6
Style	8	7	8	7	8	8
Weight	6	7	7	4	6	6
Comfort	6	8	7	7	5	7
Design	8	6	9	7	8	7

Functional ideation

For the functional ideation part, I'm looking for materials like knit upper with TPU coated yarn for lightweight and support. Carbon fiber plate for stability and torsion resistance. Also, foam insole with custom arch support and lightweight midsole cushioning with great energy return. And I'm looking for premium full-grain and suede leather on my lifestyle shoes for comfort and high quality.



Knit with TPU coated yarn

Insole with Custom Arch Support

Full grain leather

Carbon fiber plate

Lightweight & responsive foam

Suede leather

Aesthetic ideation

The creative inspiration behind the collection was from his documentary, Linsanity. The ending captured a scene of Jeremy Lin running on water & dunking which symbolizes a sentence “walking on water”.

That scene left a deep impression on me, which led me to incorporate this aesthetic into this collection. When you think of water, it has no form. It takes shape based on its borders, it takes color based on the sky, and it will flow until you tell it to stop. Based on this idea, this collection includes 3 concepts: Seamless, Transformative, & Limitless.

Personal preference

I did some research about Jeremy Lin's personal preference for shoes. I found out that he like low-top shoes, he still didn't wear high-top shoes on court after those serious ankle injuries. And for his off-court lifestyle shoes choice, I can tell that he loves high-top classic sneakers like adidas pro model.

hyperfuse 2011 low *crazylight boost 2015 low* *crazylight boost 2016 low*

Six hundred four karemaker cambie hi *Adidas yeezy 750* *Adidas pro model*

Collection

I will design a pair of low top performance basketball shoes and a pair of high-top lifestyle shoes for Jeremy Lin. The performance shoe will mainly focus on stability, lightweight and court feel. The lifestyle shoe will feature great fit and flexibility.

Material Resourcing Plans

Basketball Shoe			
Part	Performance Goal	Material That Will Solve This	Ideas Of Where To Source The Material
Upper Quarter Panel	Support	Knit With Nylon Yarn	-Call Local Material Vendors -Contact Suppliers Through Nw Show -Contact Factory In China -Contact Xtep -Use Existing Product
Webbing	Lace Loop	Nylon	-Look In Bins -Look Under Tables In Labs -Call Local Material Vendors
Upper Toe Cap	Breathability	Engineered Mesh With Perforation	-Call Local Material Vendors -Contact Suppliers Through Nw Show -Contact Factory In China -Contact Xtep -Use Existing Product -Could Mock It With Laser Cutting
Upper Lining	Comfort	Polyester 230gsm “Nylex” Knit	-Look In Bins -Look Under Tables In Labs -Call Local Material Vendors
Shoelace	Fit	Cotton	-Look In Bins -Look Under Tables In Labs -Call Local Material Vendors
Aglet	Wrap Around The Lace	Plastic Tape	-Could Mock It With 3d Printing
Heel Counter	Stability	Molded Tpu	-Contact Composite Scrapper -Could Mock It With 3d Printing

			-Could Cast It From 3d Part -Could Lay-Up Carbon Part
Torsion Plate	Stability & Torsion Resistance	Molded Tpu Or Carbon Fiber	-Contact Composite Scrapper -Could Mock It With 3d Printing -Could Cast It From 3d Part -Could Lay-Up Carbon Part
Stitching Thread	Durability	Natural Or Synthetic Fiber	-Look In Bins -Look Under Tables In Labs -Call Local Material Vendors
Midsole	Cushioning & Energy Return	Injection Molded Eva Foam	-Could Mock It With 3d Printing -Could Cast It From 3d Part
Outsole	Traction & Flexibility &Slip Resistance	Transparent Molded Rubber	-Could Mock It With 3d Printing -Could Cast It From 3d Part
Logo Application	Decoration	Woven Label	-Look In Bins -Look Under Tables In Labs -Call Local Material Vendors
Sock Liner	Comfort & Cushioning	Molded Eva Foam	-Could Mock It With Laser Cutting -Could Cast It From 3d Part -Could Mock It With 3d Printing
Shoe Glue	Bond Each Part Together	Pu Contact Cement	-Contact Factory In China -Contact Xtep

Ideation plan

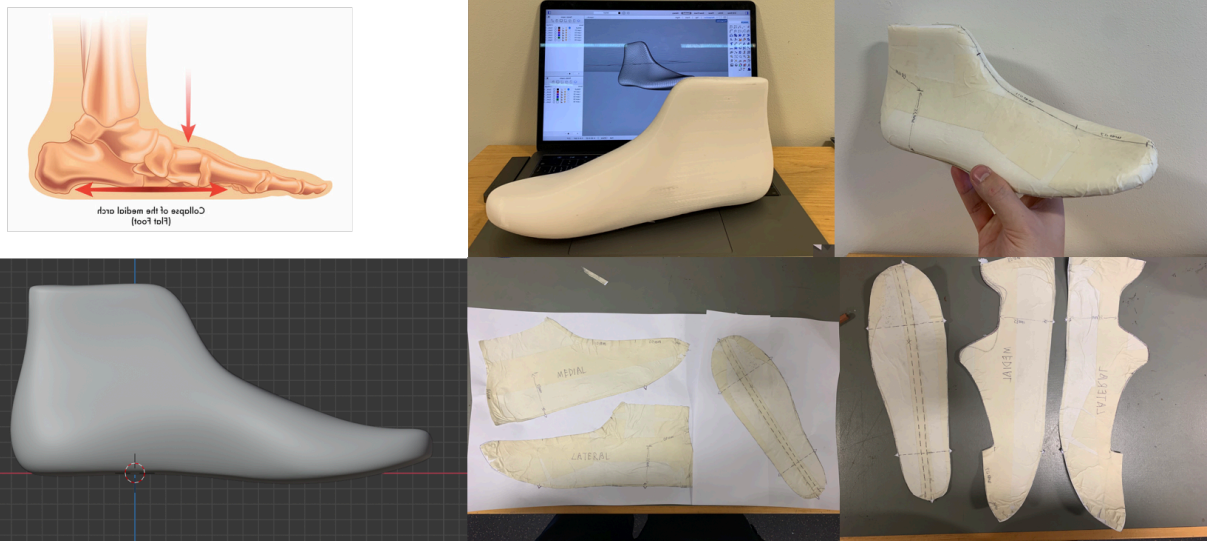
lifestyle shoe
basketball shoe

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
2/7	2/8 **midterm preview**	2/9 midterm prep	2/10 **midterm (1:30-1:45)**	2/11 midterm	2/12 break	2/13 -material selection

						-upper sketching (30 ideas)
2/14 -midsole sketching (50 ideas)	2/15 **class** -outsole sketching (50 ideas)	2/16 - sockliner sketching (30 ideas)	2/17 **class** -perspective view sketching (30 ideas)	2/18 -2nd round refined sketching (20 ideas)	2/19 -tape last and draw upper on last (20 ideas)	2/20 - upper making (15 ideas)
2/21 -scan last -3d drafting (best ideas)	2/22 **class** -3d drafting (best ideas)	2/23 -material selection -upper sketching (30 ideas)	2/24 **calss** -midsole sketching (50 ideas)	2/25 -outsole sketching (50 ideas)	2/26 -sockliner & torsion plate sketching (30 ideas)	2/27 -2nd round refined sketching (20 ideas)
2/28 -tape draw upper on last (20 ideas)	3/1 **class** -upper making (15 ideas)	3/2 -3d drafting (best ideas)	3/3 **class** -3d drafting (best ideas)	3/4 -3d rendering (best ideas)	3/5 -graphic design (30 ideas)	3/6 final preview prep
3/7 final preview prep	3/8 **final preview**	3/9 final review prep	3/10 **final review**			

Shoe last remodeling

I always remember that the shoe last is the starting point of every shoe design, and a custom shoe last is really important for this project because normal shoe lasts were created from normal feet type. So I 3d scanned a current basketball shoe last and remodeled it in blender. My new last features a fallen arch and a lower instep. Then I created the base upper pattern based on this new last to make sure my design will fit well with flat-footed athletes.



Performance goals

On court performance shoe:

1 Fit flat-footed athlete - Find flat-footed athletes to try on and let them rank the fit

2 Overall weight under 400g-Weight on a scale

3 Lightweight upper with great stability- Observe upper deformation while doing 45° hard cut

Off court lifestyle shoe:

1 Fit flat-footed athlete - Find flat-footed athletes to try on and let them rank the fit

2 Comfortable for long time walking and standing - 5-mile wear testing

3 Match Jeremy Lin's style - conduct a poll on Instagram and collect result from Jeremy' fans

Professional Development

My 5 strengths from Strengths Finder are Futuristic, consistency, relator, deliberative and positivity.

"Futuristic" will help me keep thinking about how to make an existing product better and design innovative products. "Relator" will help me form relationships with people and enjoy working with them to solve some problems in this project that I can't handle by myself. "Positivity" will help me keep optimistic and figure out the best solution when there are some challenging obstacles in this project. "Deliberative" will help me sense risk and avoid making common mistakes during the process, keep my final goal in sight.

With all these strengths together, I have a better chance to achieve my goal in this project as a product innovator.

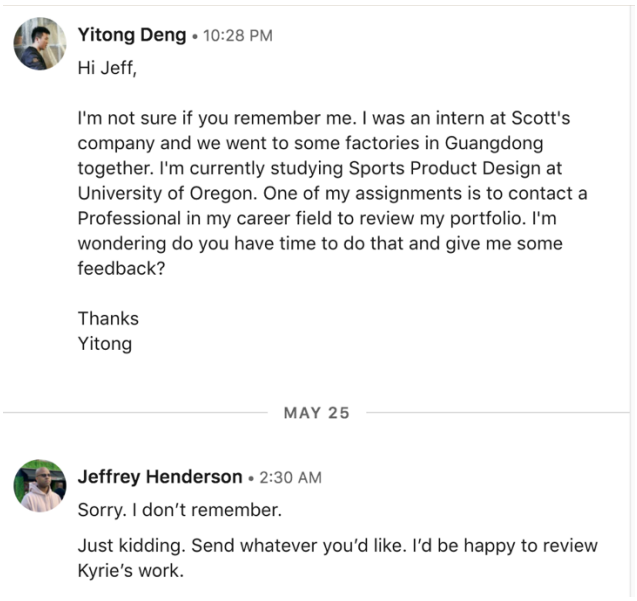
I have been a big fan of basketball fan for over 10 years and I was a high school basketball player for 2 years. I know how important a great pair of basketball shoes to players. I think my strength is that I will combine both the perspective of a footwear designer and a basketball player into this project.

I always love to try new basketball shoes with innovative technology, and always imagine what will a pair of basketball shoes look like in 5 or 10 years. Therefore, I want to challenge myself to be innovative and make performance-driven design in this project.

My ideal job is to work as a basketball shoe designer after graduating from this program. I think this capstone project is a good opportunity for me to work with company and people in the footwear industry. I hope I will gather experience and have a better understanding of how to design a pair of shoes from brief to final product and prove myself is qualified to be a footwear designer.

Industry Mentors

Jeffrey Henderson (over 20 years work experience at Nike & Cole Hann)



Yitong Deng • 10:28 PM

Hi Jeff,

I'm not sure if you remember me. I was an intern at Scott's company and we went to some factories in Guangdong together. I'm currently studying Sports Product Design at University of Oregon. One of my assignments is to contact a Professional in my career field to review my portfolio. I'm wondering do you have time to do that and give me some feedback?

Thanks
Yitong

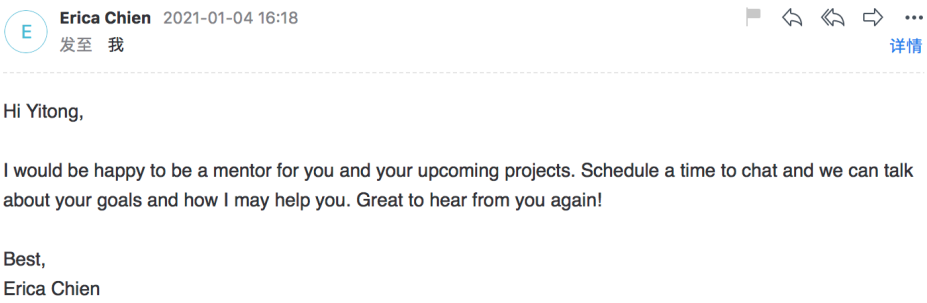
MAY 25

Jeffrey Henderson • 2:30 AM

Sorry. I don't remember.

Just kidding. Send whatever you'd like. I'd be happy to review Kyrie's work.

Erica Chien (Bachelor of Science in Athletic Training in Indiana University Bloomington)



E **Erica Chien** 2021-01-04 16:18
发至 我
详情

Hi Yitong,

I would be happy to be a mentor for you and your upcoming projects. Schedule a time to chat and we can talk about your goals and how I may help you. Great to hear from you again!

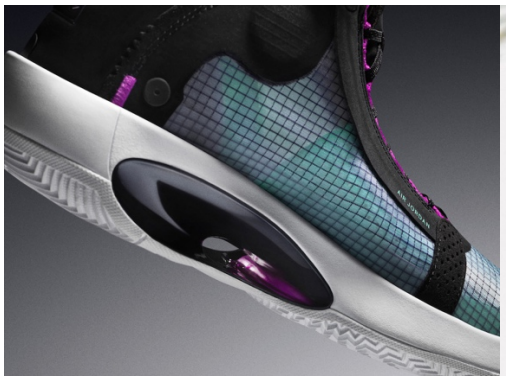
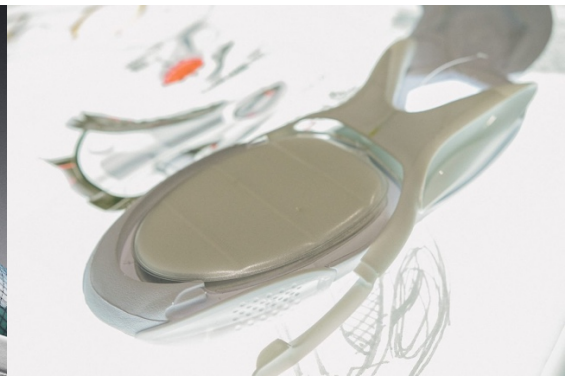
Best,
Erica Chien

New technology

Upper: 360-Degree Flyknit (NIKE KOBE AD NXT 360) 360-degree flyknit provides a higher level of lockdown thanks to its foot-wrapping fit. The all-encompassing design is also said to improve speed and agility by bringing the wearer closer to the ground. And perhaps most important of all, the increased use of Flyknit makes the 360-degree iterations more sustainable than previous models by further reducing traditional cut-and-sew methods.

Cushioning: Nike Air Zoom Turbo is a new basketball technology that delivers wide forefoot cushioning. It rotates with each, multidirectional cut and delivers an explosive return of energy.

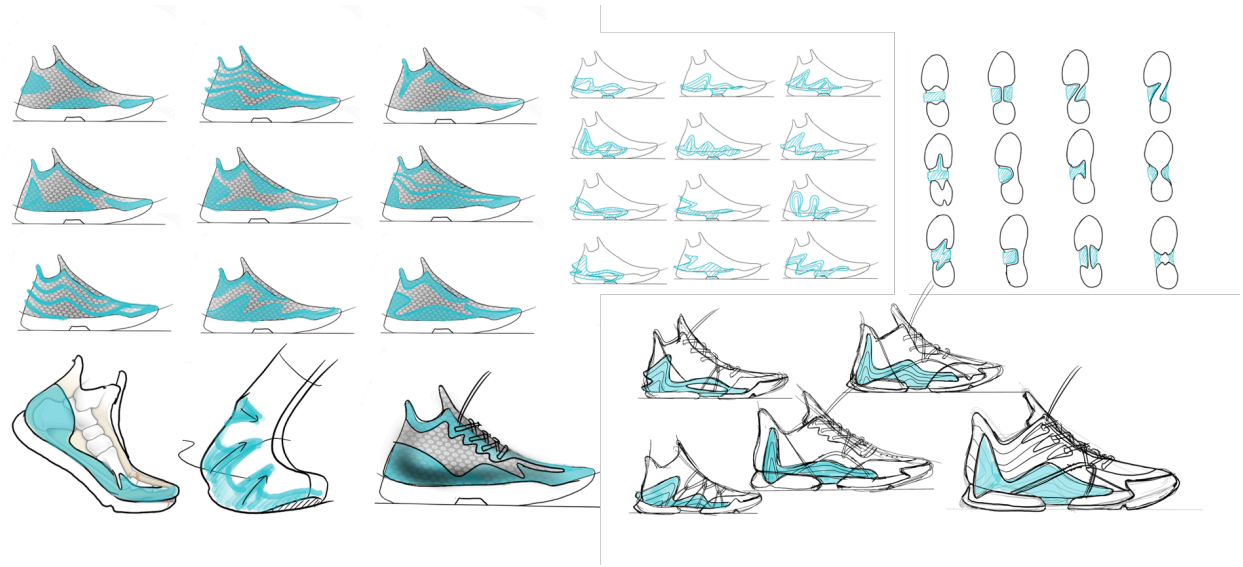
Torsion system: Eclipse Plate (AIR JORDAN XXXIV) Eclipse Plate features a smooth transition from the mid-foot to the forefoot which allows the athlete to be more controlled and jump faster. This allows for lateral support. In addition the plate is made of two Pebax pieces with a hollow core where foam would normally be. This exposes the Zoom Air unit and helps for stability.

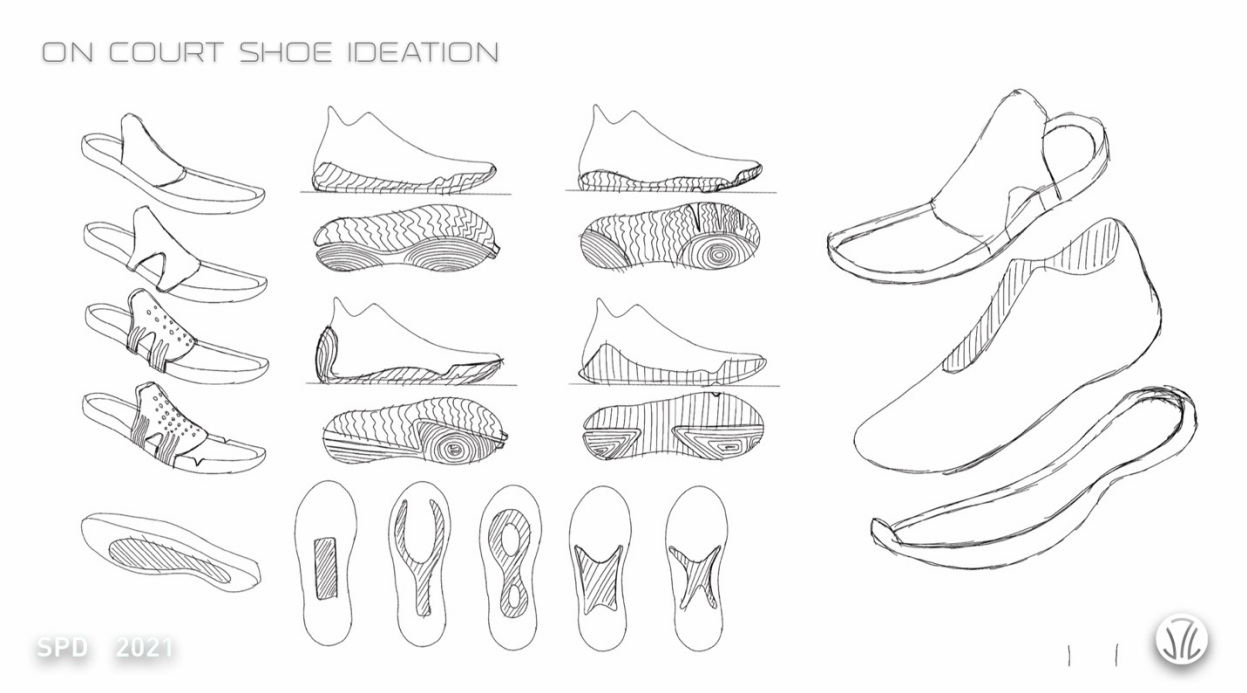
Outsole: UA Flow （curry 8）The first and only foam that combines lightweight cushioning and ground breaking traction. Developed by DOW chemical and utilizing UA data-driven geometry for optimized fit and ground force interaction.


On court Basketball shoe Ideation

Below are some ideation sketches for the performance basketball shoe, based on Jeremy Lin's playing style and the benchmark testing result, I was focusing on the upper reinforcement area for support like lateral midfoot and heel, also came up with an idea of combining the torsion plate and heel counter as one-piece construction for stability.



Flat foot is caused by a falling arch, where the midfoot flattens with pressure. This creates a severe longitudinal bending that forces the arch down. The drop-in midsole is designed to provide a larger surface area for the foot and elastic bands attached to the midsole pulls the arch upwards to minimize inversion. The outsole pattern is designed specifically to provide more protection to high traction areas for low arch athletes.



Based on many iterations of silhouettes here is the final design for the on-court basketball shoe.

On court Basketball shoe Prototypes

I created the shall pattern based on my favorite design and laser cut them in many different materials, tried different combinations of those materials to see which construction was lightweight with great support. I pretty like this 3-layer construction upper, which is ripstop on top, a TPU coated reinforce piece in between and a knit upper as underlay. Then I sewed this upper and put it on a scale, it's only 46 grams, and my benchmark shoe upper is 141 grams, even without laces and strobel.

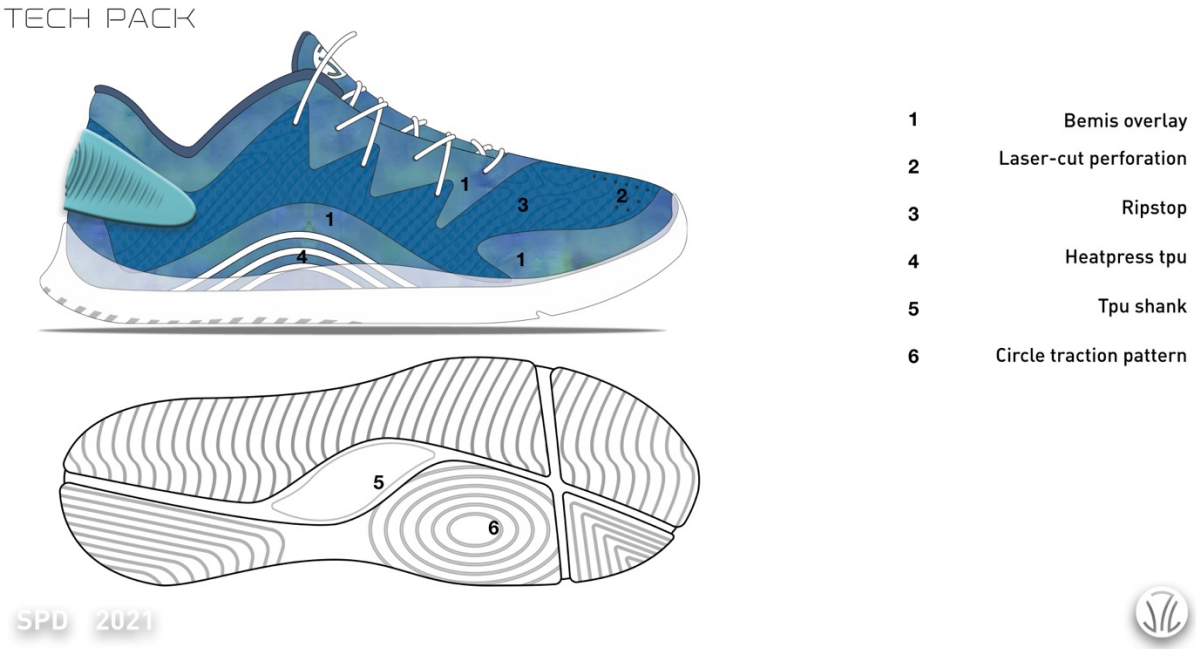
Testing

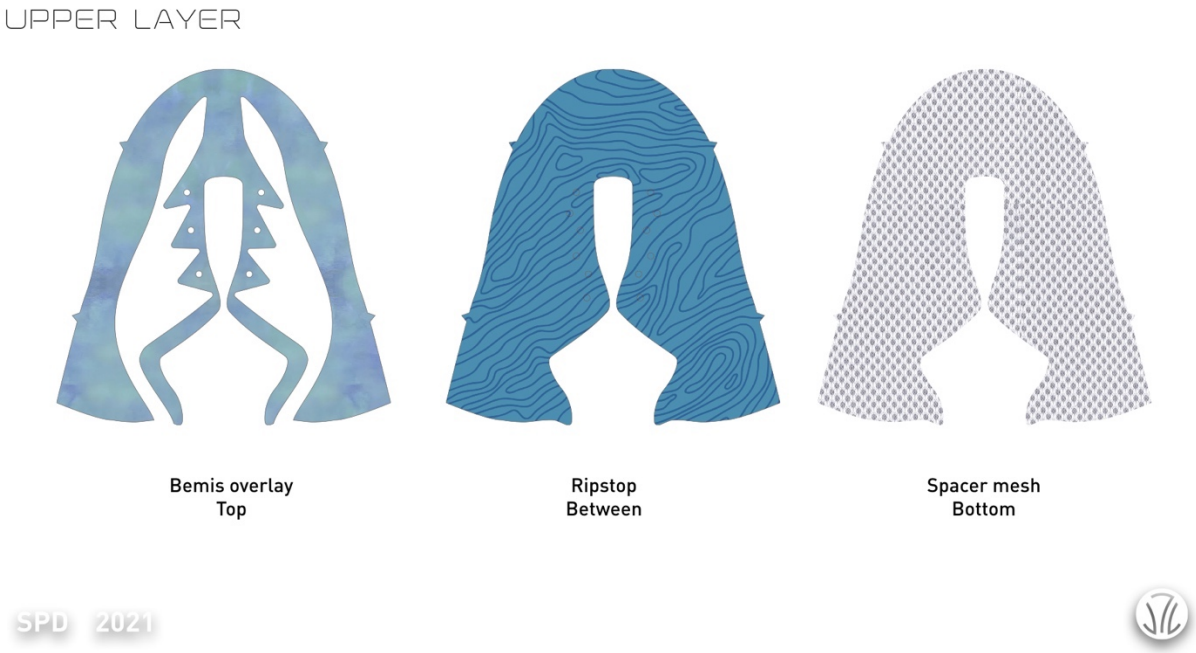
I bought drop-in midsole shoe and attached elastic bands to directly to the midsole. Then, I tested the product by having an athlete with flat feet wear the proto against a normal midsoled basketball shoe. The conclusion was the drop-in midsole was more comfortable and had a better arch stability.

Features and benefits

Below is the exploded view of the basketball shoe, which features the 3 layer construction upper for support and protection, a nylon thread for midfoot lockdown, a TPU torsion plate for stability and a curved outsole with a multi-direction ripple pattern for traction.

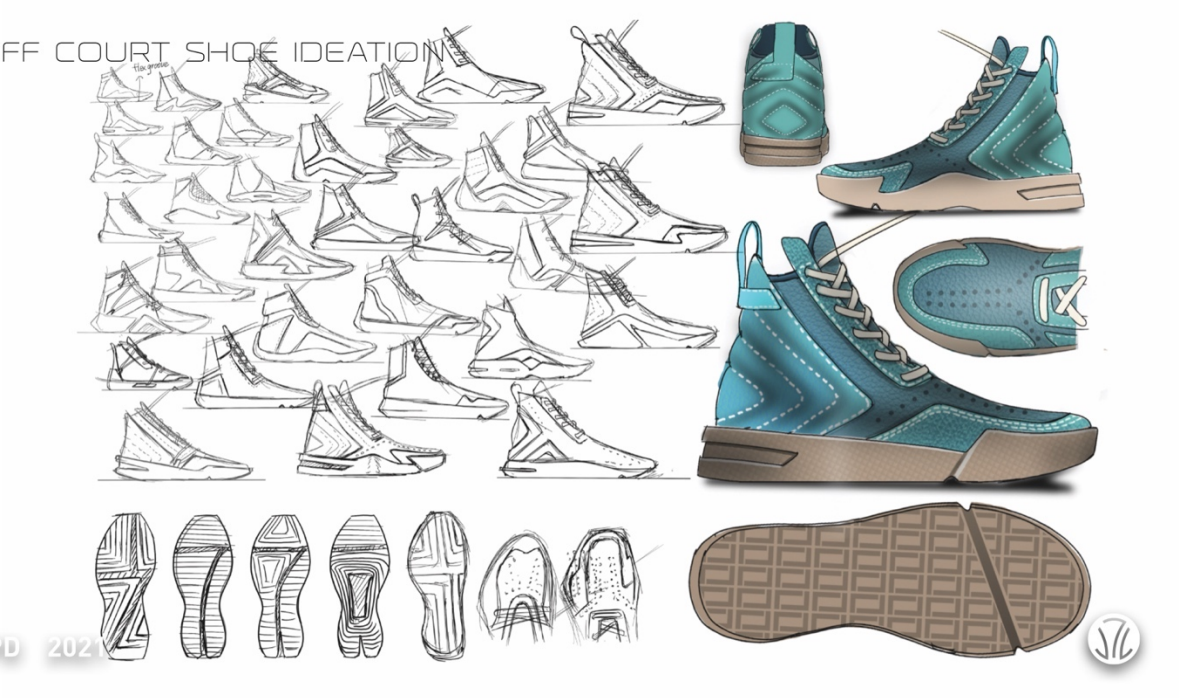
Basketball shoe Tech Pack



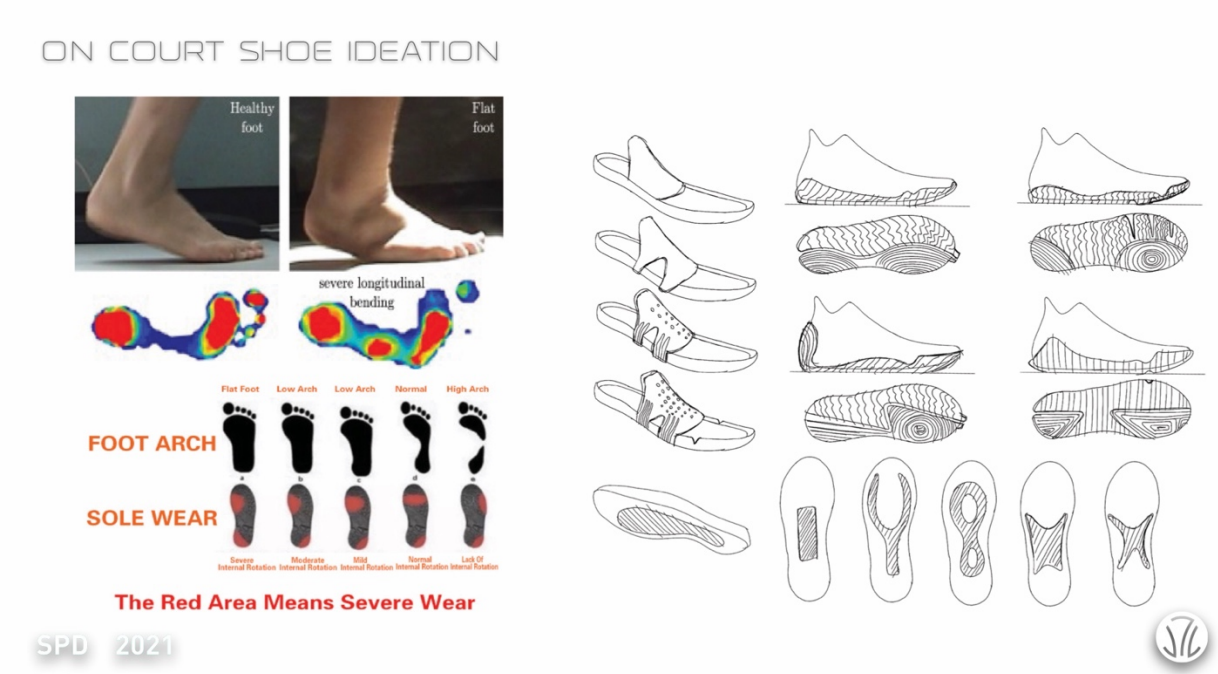


Off court recovery shoe Ideation

Moving to the recovery shoe ideation, based on Jeremy Lin's lifestyle shoe choice, I thought most of those old-school style sneakers have chunky outsoles, which don't provide good flexibility. The upper sketch is more aesthetic driven and had some outsole flex groove ideations.



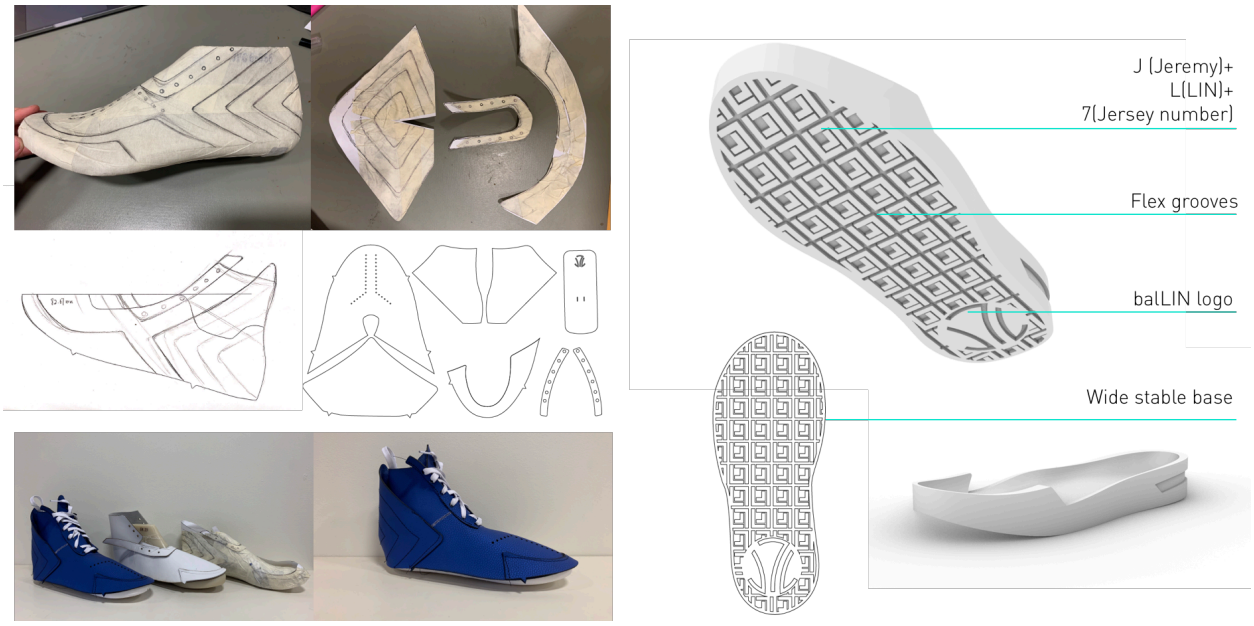
The main benefit of this shoe is the use of the Chinese medicine pressure map to promote increase blood circulation, improving recovery time. The drop-in midsole contains a massage pad that is mirrored after Chinese medicine pressure points, specifically the toe, arch, and heel.



With this research in mind, here is the final sketch of the off-court recovery shoe.

Off court lifestyle shoe Prototypes

I taped the shoe last and refined my design on it, then I created the upper pattern and sewed it. I also designed the outsole pattern which consisted of Jeremy Lin's initials and his jersey number 7. And I 3d modeled the tooling in rhino, It's a concave pattern to have more flex grooves.



I also want to create an illusion of Jeremy Lin walking on water with a ripple patterned outsole. This pattern started off as a ripple image that I turned it into black and white in Photoshop, then I drag it in blender and using displacement map to create this organic ripple like outsole pattern for the recovery shoe. At the end, 3D printed it and mold it with clear rubber.

Features and benefits

This recovery shoe features a suede eye stay for durability; an "L" shape heel pull tab represents Jeremy's last name. An asymmetric toe box for toe protection. The 'ripple' heel counter cradles the heel and there are some laser-cut perforations for breathability. Also it has a drop-in Eva midsole instead of a sock liner and a wide base outsole with multi-flex grooves for flexibility.

Recovery shoe Tech Pack

TECH PACK

1 "L" shape pull tab
2 Laser-cut perforation
3 Asymmetric suede toe box
4 Full-grain leather
5 Suede eyestay
6 Zigzag stiching

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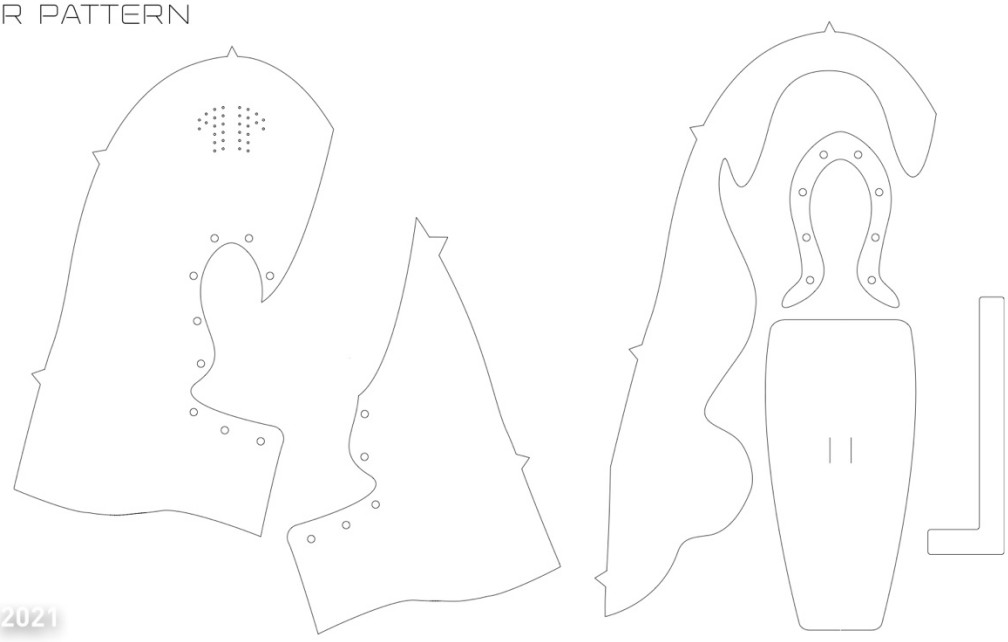
UPPER PATTERN



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Final Product


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Package

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