
SHOEMAKERS
ACADEMY

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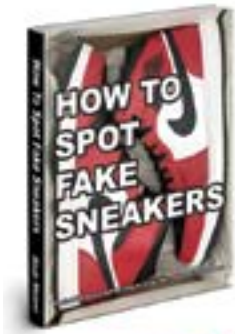
Start Your Shoemaking Journey.
Let us guide you step-by-step in the world of shoemaking.

Visit our website and online bookstore at **ShoemakersAcademy.com** for shoemaking books, tools, and supplies for beginners, designers, and footwear professionals.



1 How to Spot Fake Sneakers

You will never look at shoes the same way again.
See your favorite Nike, Vans, and Adidas shoes in a whole new way. Our guide to sneaker authentication literately cuts deep into the world of counterfeit sneakers. You will learn how to inspect and authenticate sneakers like a professional. You will speak the language of sneakers and you'll never get burned buying fakes again.

2 How Shoes are Made

Launch your professional shoe career here.
Is your career goal to work for a big brand like Nike or Converse? Maybe you have your own brand and designs to produce and sell? You are in the right place. *How Shoes are Made* is your launching pad - see and learn every step from shoe design to development, manufacturing to exporting, and more from inside a shoe factory.

3 Footwear Pattern Making and Last Design

Transform your designs into real shoes.
When you are ready to explore the heart of shoemaking you must understand how the last and pattern work together to create a shoe. This book will pull you into the shoemakers world of last design, size grading, and pattern cutting.

4 The Shoe Material Design Guide

Materials make it real
Turn your drawings into factory ready footwear specifications. You will learn how to specify a shoe by looking inside the classic styles of modern footwear. This book shows you what materials Nike and Adidas pick to build their iconic shoes.

5 How to Start Your Own Shoe Company

Build your brand, your business, and your dreams.
Written for everyone who dreams of starting their own shoe company. You will identify with the brand building challenges and uncover the solutions to the crucial steps such as creating your brand identity, legally setting up your company, registering your trademarks and patents, getting your shoes designed, built, paid for, and finally, marketing and selling your shoes.

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Shoe Business Masterclass

Online shoemaking courses for shoe designers, footwear developers, and brand builders. Courses for beginners, designers, and footwear professionals. Learn modern footwear manufacturing techniques. Advance your career in the shoe trades.

Over 100 Footwear Lessons

Our on demand video courses cover modern Footwear Design, Development, Sourcing and Manufacturing. Course topics include footwear Design, Costing, Import Duty, Quality, Specifications, Fitting, Comfort and Sustainability.

Courses for Shoemakers By Shoemakers

Every course presented by top shoemaking author Wade Motawi, "The Shoe Dog" Wade Motawi is a veteran shoemaker with 25 years of experience. Wade is a working shoemaker facing the same challenges.

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Sneaker Construction 101

SHOEMAKERS ACADEMY

Sneaker Construction 101

What is a shoe last?
The last is a roughly foot-shaped form made of molded plastic, carved wood, or cast aluminum. The shape of the last determines the fit, performance, ergonomics, and styling of a shoe. It is also what makes a shoe suitable for playing basketball, climbing mountains, or running a marathon.

The shoe last is the starting point of every sneaker design. The last is the center of the entire shoemaking process. The shoe designer starts with the last and builds the shoe outward. The last is critical to the shape of the shoe. The last sets the size, silhouette, and outline of the shoe.

When a shoe is in production, the stitched pattern will be stretched over the last to create the final shape. This operation is called "lasting." There are several different lasting techniques used to pull the patterns into shape. These include force/Strobel lasting, board lasting, string lasting, toe lasting, heel lasting, hand lasting, and machine lasting. Once the shoe upper is pulled tight to the last, the outsole can be attached. The last holds the soft upper in place while the outsole is attached using glue.

The parts of a sneaker

Basic sneaker upper construction: Strobel lasting vs. board lasting

Strobel Lasting

Strobel, slip, force, or California lasting are the most common shoe constructions for casual and athletic sneakers. Once the upper is complete, a "sock" or bottom is added to "close" the bottom of the upper. During the final assembly process, the upper is heated and slipped onto the last; then, it is cooled, causing the material to tighten on the last.

Here the Strobel sock is attached to the upper.

This is what the Strobel sock looks like inside the shoe. You will need to lift the footbed to see the stitching.

Board lasting

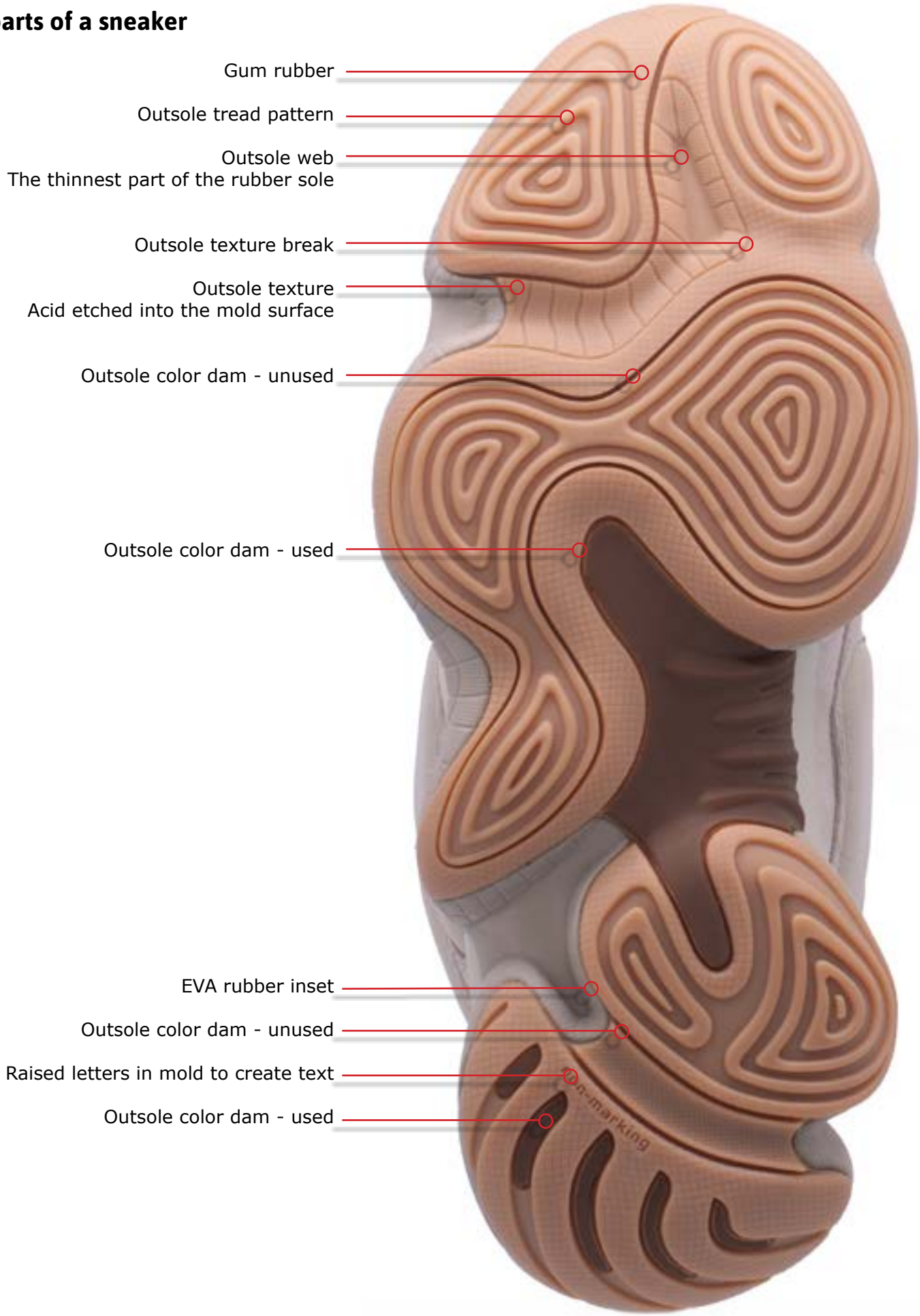
Board lasting is a very common process used to make any shoe requiring a stiff bottom. The open upper is placed into a lasting machine that grips the upper and pulls it down onto the last. The last has been prepared with a paperboard or plastic lasting board temporarily attached to the bottom.

In one operation, the lasting machine pulls the upper tight around the last and injects glue between the upper and the lasting board. A heel-lasting machine and some hand pulling will complete the operation before the outsole is attached.

Here a worker is using lasting pliers to wrap the upper over the edge of a lasting board.

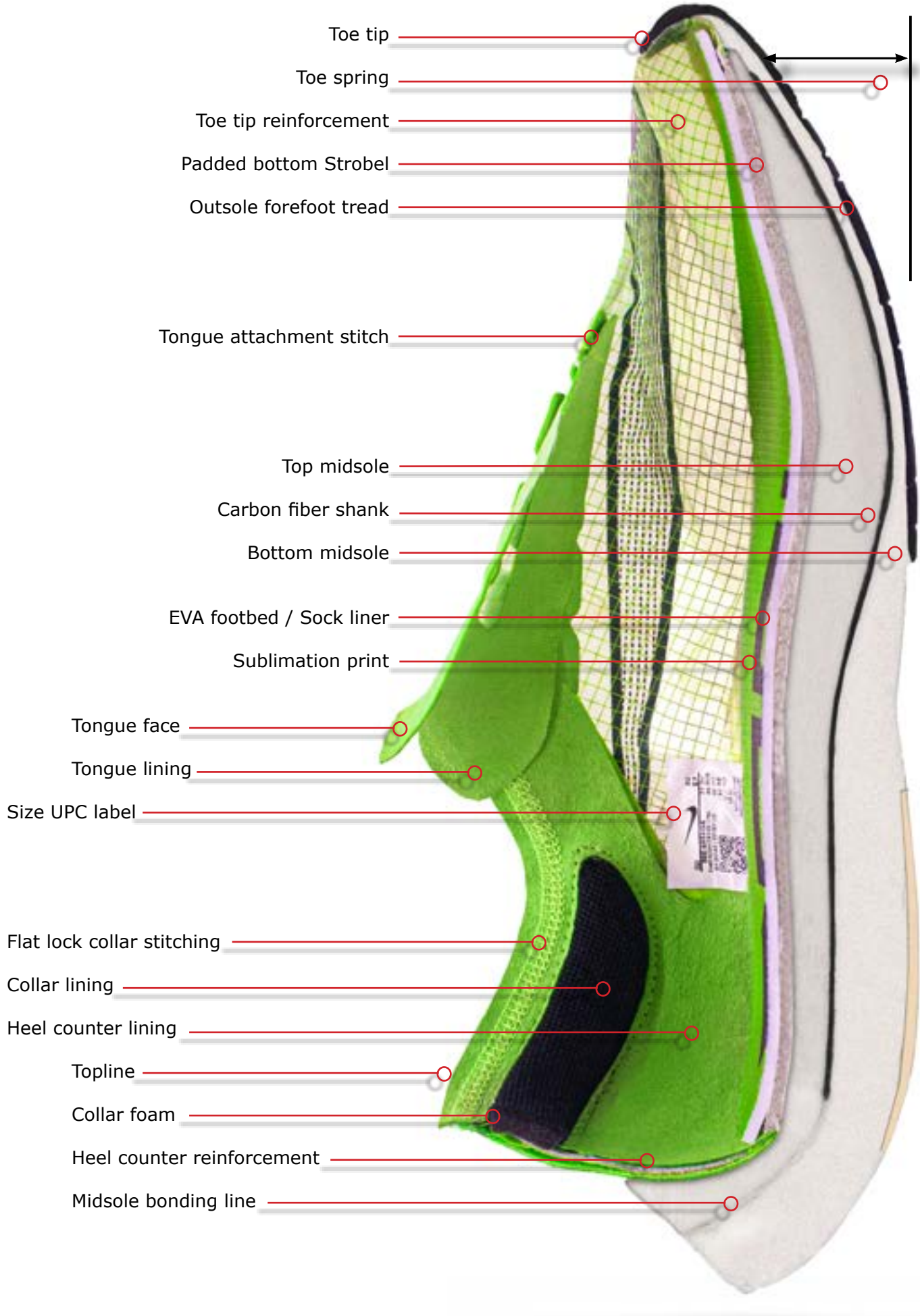
This is what a board lasted shoe looks like inside - no edge stitching.

The parts of a sneaker



The parts of a sneaker

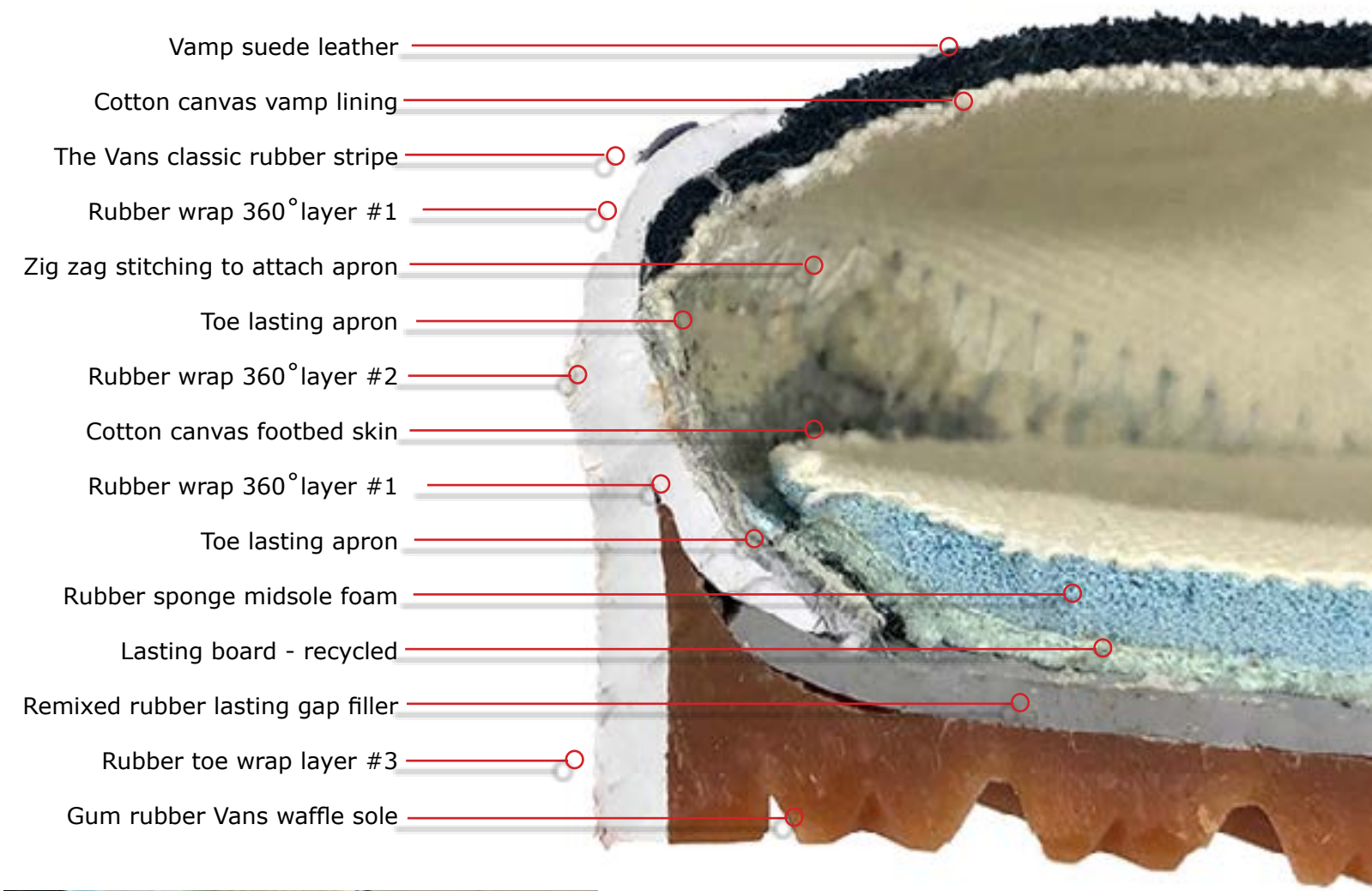
The inside of a cold cement sneaker



Footwear construction: Vulcanizing

Let's review how the classics are built. Vans and Converse shoes are made using the vulcanization process. To make the Vans Old Skool shoe, the factory wraps strips of raw rubber around the shoe to make the outsole sidewalls. The entire shoe is then "cooked" to vulcanize the rubber parts.

Here you can see a Vans sneaker board lasted and vulcanized.



Inside a board lasted shoe

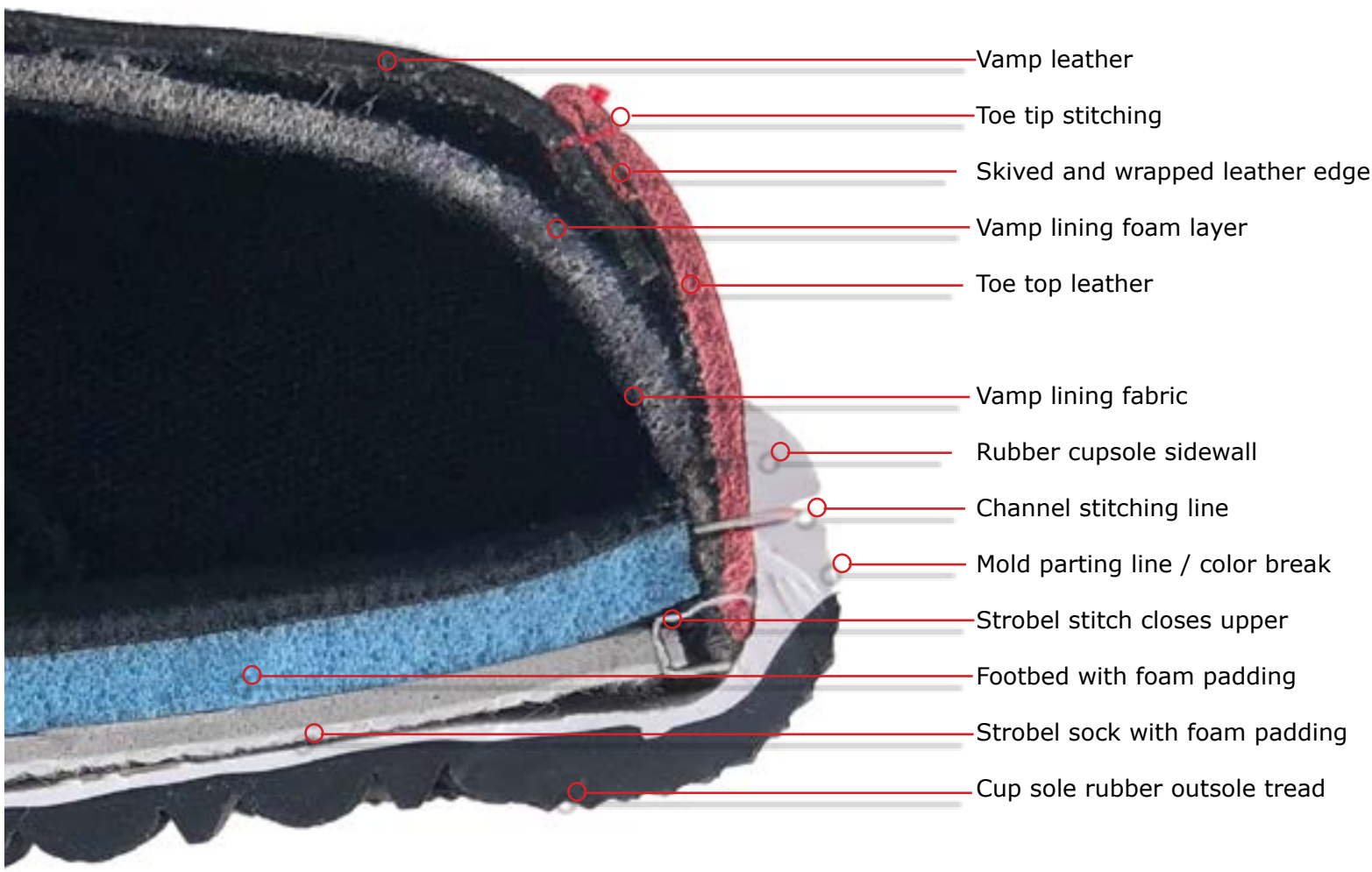
When inspecting a board-lasted shoe, you may find the footbed and lasting board are bonded together and glued down. You may not be able to see what is inside without damaging the shoe.

If you can remove the footbed, you may see some upper stitching around the edge; this stitching will run parallel along the edge. These are not Strobel stitches.

Footwear construction: Cold Cement

The more modern way to make a sneaker is called cold cement. "Cold" because the shoe is not cooked and "cement" because the outsole and upper are glued together with contact cement.

Air Jordan 1 is an example of a cold cement shoe made by the Strobel lasting process.

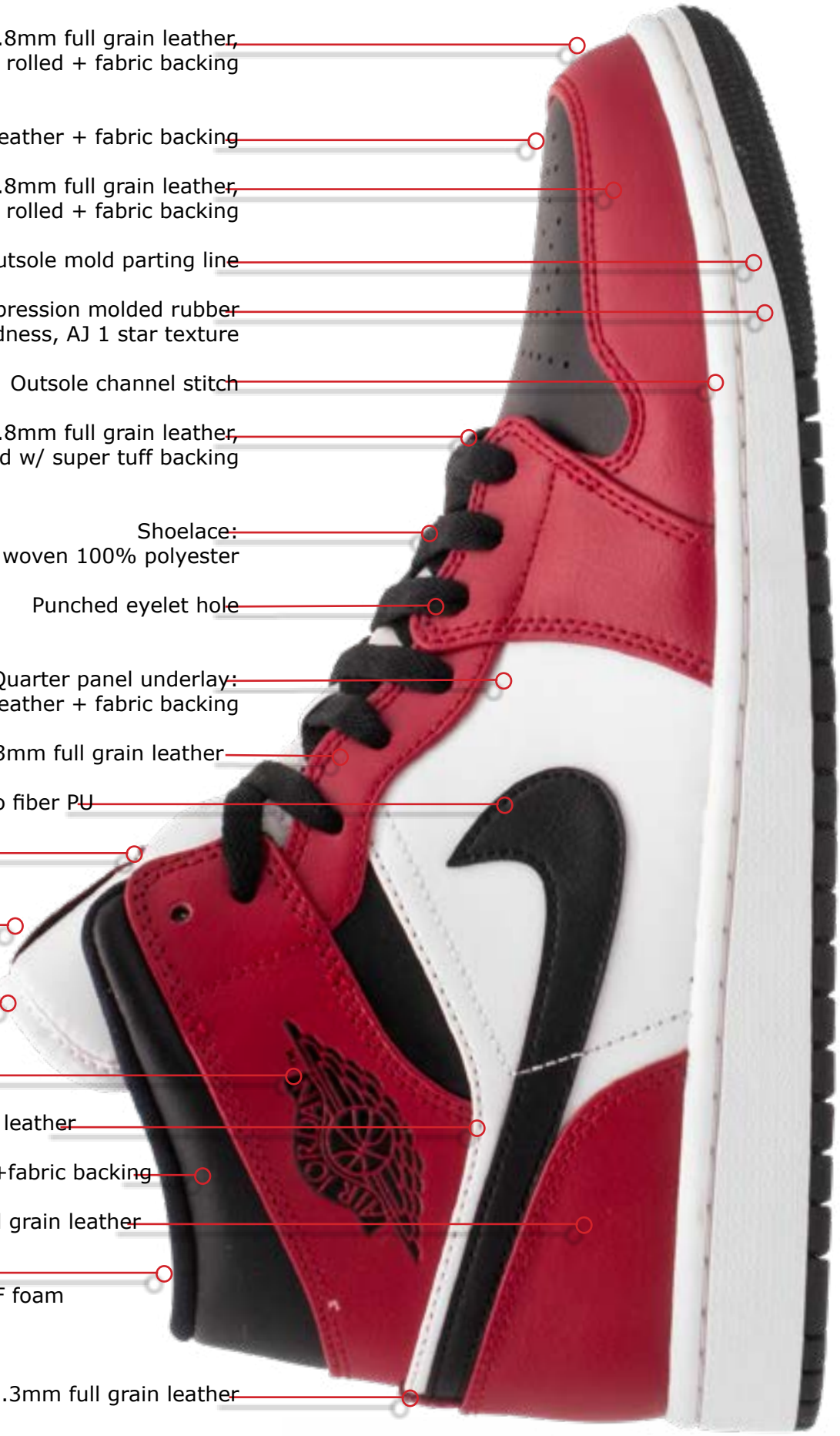


Inside a Strobel lasted shoe

When inspecting a Strobel shoe, you should be able to peel up the footbed. In most sneakers, the footbed is held in place with tacky glue and not permanently fixed.

Under the footbed you will see the perpendicular Strobel stitching running the full 360° around the bottom of the shoe. In this shoe, you can see the long loose threads from the channel stitching operations.

Authentic Air Jordan 1 Mid OG



Toe tip: 1.8mm full grain leather, edges rolled + fabric backing

Vamp: 1.5mm full grain leather + fabric backing

Mudguard: 1.8mm full grain leather, edges rolled + fabric backing

Outsole mold parting line

Outsole bottom: compression molded rubber 72° Shore "A" hardness, AJ 1 star texture

Outsole channel stitch

Lower eyestay: 1.8mm full grain leather, edges rolled w/ super tuff backing

Shoelace: 8mm flat woven 100% polyester

Punched eyelet hole

Quarter panel underlay: 1.25mm PU leather + fabric backing

Eyestay: 1.3mm full grain leather

Die-cut logo: 1.0mm Micro fiber PU

Tongue face: 220D nylon, 4mm KFF foam

25mm woven label, two-tone logo

220D tongue binding, polyester fabric

AJ logo print + emboss

Eyestay: 1.3mm full grain leather

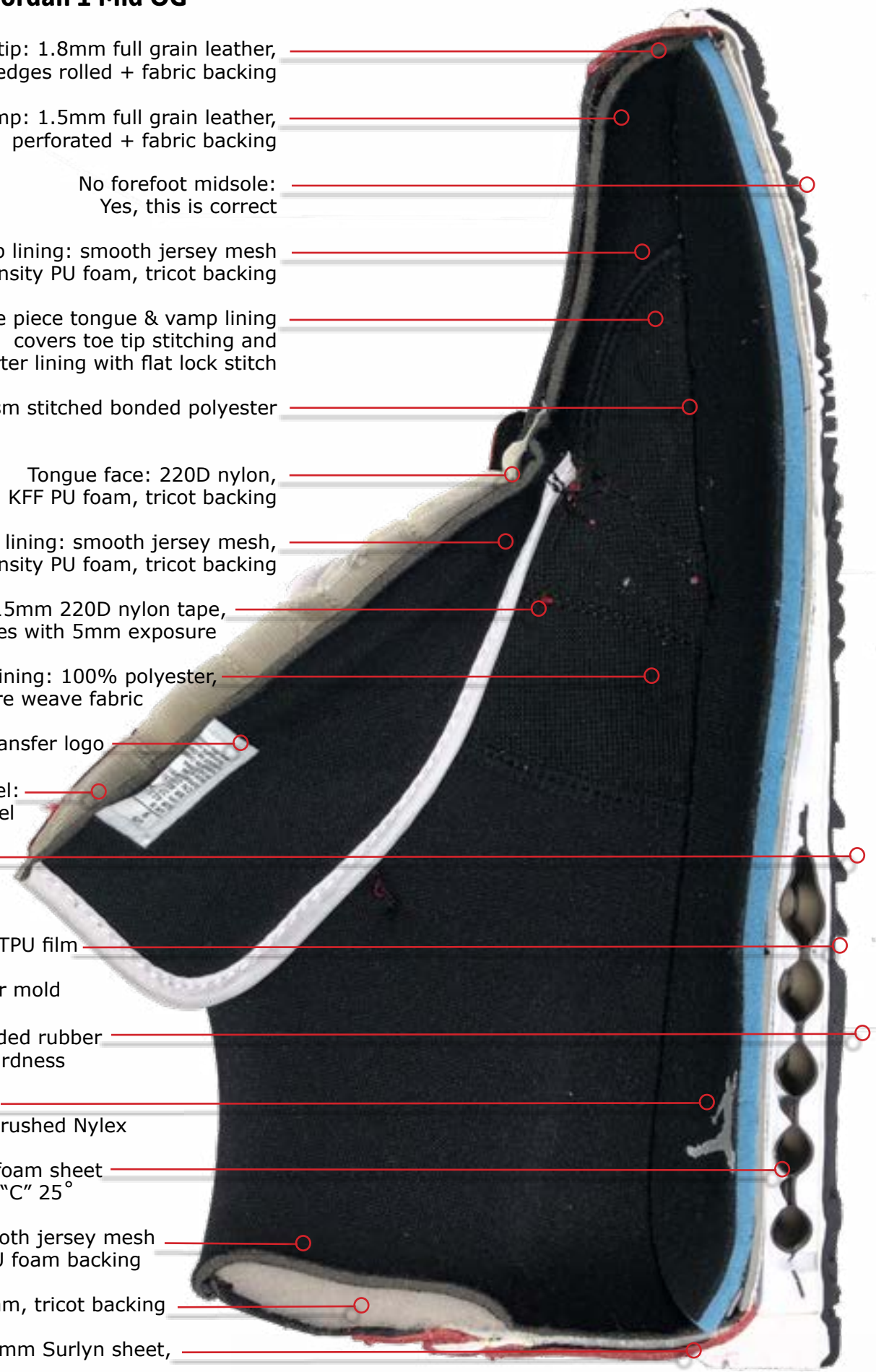
Collar: 1.2mm PU leather+fabric backing

Counter cover: 1.3mm full grain leather

Collar lining: knit jersey + 4mm HD KFF foam

Back tab accent: 1.3mm full grain leather

Authentic Air Jordan 1 Mid OG



Toe tip: 1.8mm full grain leather, edges rolled + fabric backing

Vamp: 1.5mm full grain leather, perforated + fabric backing

No forefoot midsole: Yes, this is correct

Vamp lining: smooth jersey mesh 2mm high density PU foam, tricot backing

One piece tongue & vamp lining covers toe tip stitching and joined to quarter lining with flat lock stitch

200gsm stitched bonded polyester

Tongue face: 220D nylon, 2mm KFF PU foam, tricot backing

Tongue lining: smooth jersey mesh, 2mm high density PU foam, tricot backing

Tongue binding: 15mm 220D nylon tape, double rolled edges with 5mm exposure

Quarter backing/lining: 100% polyester, low stretch, square weave fabric

Size mark heat transfer logo

25mm woven label: two-tone logo label

Poured PU foam midsole wedge Asker "C" 45°

RF welded .5mm TPU film 5 column air cell with PU foam over mold

Compression molded rubber 72° Shore "A" hardness

Sockliner cover: 100% polyester brushed Nylex

Die-cut 5mm PU foam sheet Durometer Asker "C" 25°

Collar lining: smooth jersey mesh +2mm HD KFF PU foam backing

15mm KFF PU foam, tricot backing

Heel counter: 2.5mm Surlyn sheet, heat molded

Authentic Vans Old Skool

Vamp: split suede,
1.3mm, low nap, chrome tanned

Molded rubber texture:
toe tip rubber wrap foxing tape

Molded rubber stripe:
inner layer rubber wrap foxing tape

Molded rubber texture:
outer layer rubber wrap foxing tape

Deco stitching with the Vans kink:
bonded nylon 6.6 thread M8, 400D

Eyestay:
1.3mm, low nap, split suede, .5mm Super-Tuff

Shoelace: 10mm x 1.5 mm
100% polyester, flat braided

Quarter panel: cotton canvas, 8oz. weight,
1mm SBR foam backing

Quarter panel logo: Vans "Jazz Stripe"
die-cut chrome tanned action leather

Tongue face: cotton canvas 8oz.,
1mm SBR foam backing

Punched eyelets: 4mm x
.5mm, Super-Tuff reinforcements

Tongue binding: knit polyester jersey,
single stitch, single fold, double rolled

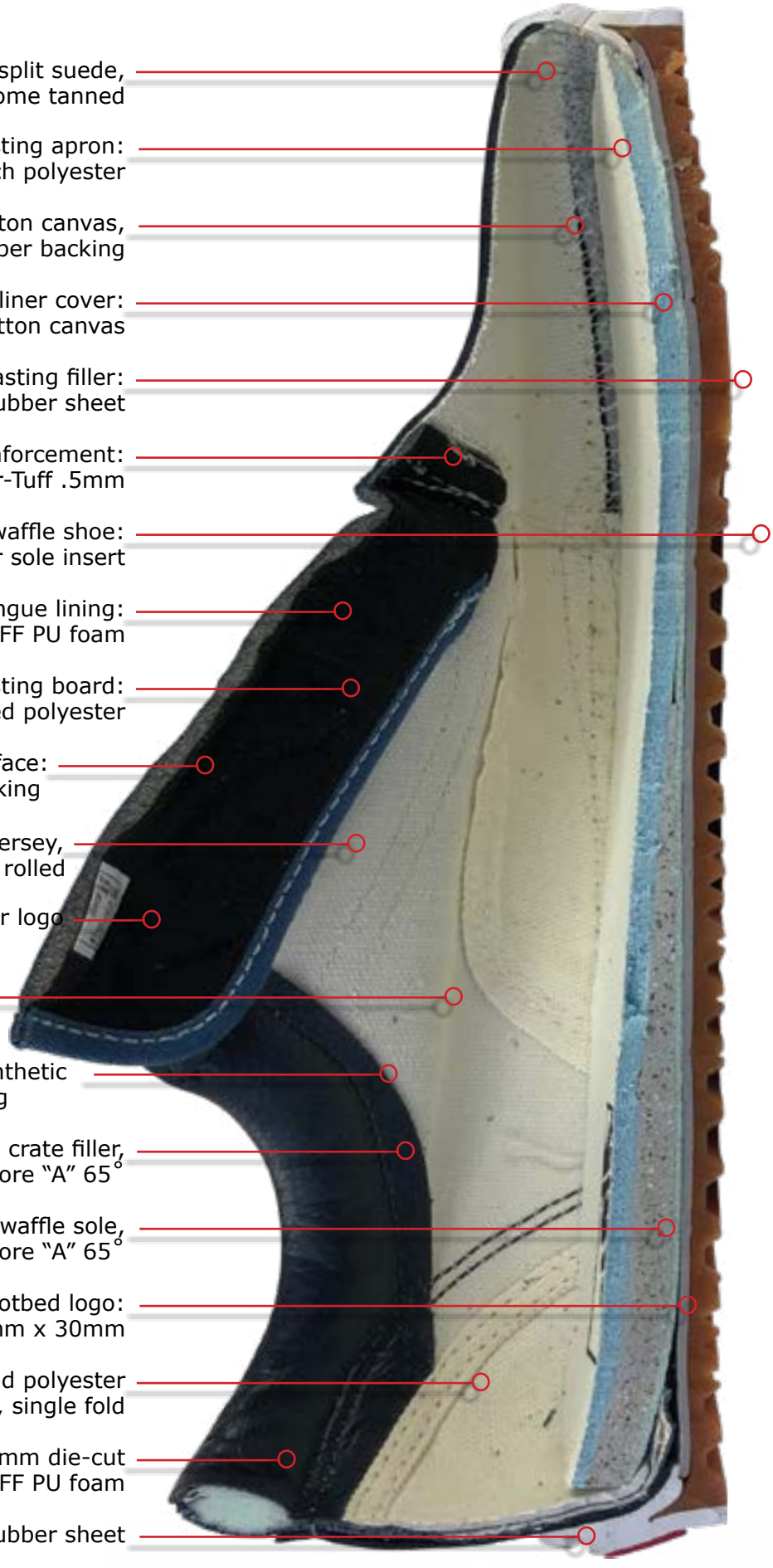
Collar line: deco stitching
bonded nylon 6.6 thread M8, 400D

X-ray line in the rubber foxing tape
is an authentic feature of vulcanization

Heel counter cover:
1.3mm, low nap, chrome tanned, split suede

Heel logo: "license plate,"1.5mm,
screen printed die-cut rubber

Authentic Vans Old Skool



Vamp: split suede,
1.3mm, low nap, chrome tanned

Toe tip lasting apron:
zig-zag non-stretch polyester

Vamp/quarter lining: 8oz. cotton canvas,
1mm SBR rubber backing

Sockliner cover:
8oz. cotton canvas

Lasting filler:
1.5mm reprocessed rubber sheet

Tongue attachment eyestay reinforcement:
Super-Tuff .5mm

Vans trademark waffle shoe:
molded gum rubber sole insert

Tongue lining:
low nap polyester visa, 4mm KFF PU foam

1.25mm Cosmo Nature-Tex lasting board:
extruded matrix stitch bonded polyester

Tongue face:
8oz. cotton canvas, 1mm SBR backing

Tongue binding: knit polyester jersey,
single stitch, single fold, double rolled

Size mark heat transfer logo

Vamp/quarter lining:
8oz. cotton canvas,

Collar lining: .5mm PVC synthetic
with 100gsm woven backing

Rubber outsole: molded egg crate filler,
Density Shore "A" 65°

Rubber outsole: gum rubber waffle sole,
Density Shore "A" 65°

Footbed logo:
black screen print, 35mm x 30mm

8 oz. canvas: 250gsm stitch bond polyester
Polyester binding:150gsm, knit, single fold

Collar foam: 12mm die-cut
KFF PU foam

8oz. cotton canvas, 1mm rubber sheet

SNEAKER CONSTRUCTION TERMS

Action leather
Sueded cow leather that is covered with a thin coating of Polyurethane. The coating may be any color and may be embossed with a roller. The final product is generally a solid color leather looking product. This material is still classified as leather for import duty. Almost all white sneakers are made with action leather.

Aglet
The aglet is that little piece of plastic or metal on the end of the shoelace.

Shoe cement bonding margin
The amount of space required to have a strong cement bond. If the rubber has only a 2mm bonding margin, the outsole may peel off the upper. A 12mm bonding margin would be better.

Chemi-sheet
A non-woven reinforcement material that is impregnated with a chemical hardener that sets with the application of heat or another chemical. Used commonly for heel counter reinforcement on inexpensive shoes.

Shoe collar or top line
The opening area of a shoe at the top.

Rubber sole color dam
A color dam on a shoe bottom is a raised ridge and/or groove in a mold to stop the flow of rubber. A sneaker shoe bottom will have color dams dividing all the colors on the sole.

Cupsole or cupsole unit
A shoe outsole unit made of one piece of rubber. Called a cupsole because the sole unit "cups" the upper. Inside the cup can be EVA foam or rubber ribbed egg-crate pattern.

Cut and buff midsole

The cut and buff shoe midsole is the classic running shoe construction. The Nike Cortez and many New Balance classics use this assembly method. A cut and buff midsole is made by cementing a profile cut EVA to a flat rubber midsole. The profile of the EVA makes the toe tip thinner and the heel thicker. Once the EVA is bonded to the rubber, the parts are die-cut to the correct outline shape. The assembly is taken to a grinding stone to have the side angle buffed.

Die-cut EVA midsole

The die-cut EVA midsole is a simple way to add cushioning foam to the bottom of a shoe. The shoe sole will have a cavity molded into the rubber. A piece of die-cut foam is simply glued into the cavity. The die-cut EVA midsole can be flat, or can be profile cut. This EVA is not visible from the outside of the shoe. The sole unit will surround it, and it will be under the lasting board or Strobel sock.

Durometer

Durometer is the hardness of a material. You will need to specify the durometer of all the rubber, foam, and plastic parts. You will need two different durometer testers. Asker "C" is the EVA standard. 25 "C" is very soft, 55 "C" is a standard midsole, and 85 "C" is like wood. For rubber and plastic, you will need a Shore "A" tester. For a rubber outsole Shore "A" 55 is good. Above 60, your rubber will be stiff, heavy, and slippery. The durometer scale was defined by Albert Ferdinand Shore, who developed a measurement device to measure Shore hardness in the 1920s.
Shore 20A = rubber band, Shore 40A = pencil eraser, Shore 60A = car tire tread, Shore 80A = leather belt, Shore 100A = shopping cart wheel

CM EVA or EVA foam

Compression Molded EVA or Ethylene Vinyl Acetate. A foam midsole material that offers good cushioning and compression set. Nike likes to call their EVA "Phylon," it is the same material regardless of the name you call it. EVA is the most common foam for shoe midsoles. Easy to form by cutting, molding, or injecting. It's light and durable. EVA can be made in many grades depending on the compound. More or less filler, more or less vinyl acetate in the mix. EVA foam can be made pillow soft or rock hard.

EVA

Ethylene vinyl acetate is the copolymer of ethylene and vinyl acetate. The weight percent of vinyl acetate varies from 10 to 40%, with the remainder being ethylene. EVA is the most common foam used for shoe cushioning. It can be hot or cold-pressed, made in any color, and in a range of hardnesses.

Eyelet

A hole through which you lace up a shoe.

Eyestay

The part around the lace opening (throat of the shoe). Can feature webbings, eyelets, etc.

Footbed

Footbed, or insole, or sock liner. This is the foam-padded mesh that your foot stands on. It may be removable or cemented in place. In high-end shoes, the footbed will be molded EVA or PU foam. In low-end shoes, it will be die-cut EVA.

Foxing tape

The foxing tape is the rubber band that makes the sidewall of the shoe sole on vulcanized shoes.

Full grain leather
Full grain leather refers to hides that have not been sanded, buffed, or snuffed (as opposed to top-grain or corrected leather) to remove imperfections (or natural marks) on the hide's surface. The grain remains, allowing the fiber strength and durability. The grain also has breathability, resulting in less moisture from prolonged contact. Rather than wearing out, it will develop a patina over time. High-quality leather furniture and footwear are often made from full-grain leather.

Glue allowance or glue line
The standard glue allowance is 2mm. The outsole glue may be applied up to 2mm above the outsole top edge. This allows for a good bond. Too much glue can turn yellow later.

Heel counter
Internal or external, the heel counter is the pattern part that covers the heel of the shoe. The internal heel counter can be made of rubber (for vulcanized shoes), thermoplastic (for cold cement shoes), chemi-sheet (for inexpensive shoes), or leather (for dress shoes). Depending on the shoe type, the counter can be thin and soft or stiff and sturdy.

Heel notch
The heel notch is at the back of a shoe's top line, above the heel counter, the shoe may have a dip in the center.

Heel lift
The heel lift of a shoe or shoe last is the dimension specified for the heel height above the ground. This is determined by the last of a shoe. A normal sports shoe will generally have a heel lift of 6 to 8mm above the ball of the foot. This is a standard ergonomic stance that will allow the shoe to have more cushioning under the heel. A casual shoe or sandal may have a lift of zero, and a high heel women's shoe last can have a heel lift of 4 inches or more.

Heel stabilizer
The heel stabilizer can be rubber, plastic, or leather. The stabilizer is bonded to the upper and midsole on the outside of the shoe as a functional and stylized part. Very common on the classic cut and buff style midsole type.

Insole
Footbed, or insole, is the foam padded mesh that your foot stands on. It may be removable or cemented in. The insole for high-end shoes will be molded EVA or PU foam. The insole for low-end shoes will be die-cut EVA.

Insole Board
A paper-based board used to provide structure inside a shoe. For example, a stiff hiking boot will have a thick plastic lasting board. Also called a sock liner.

Lace Loop
Usually made of nylon webbing. A very common way to attach laces. Also called a ghilly loop. This style can be sewn under the eyestay to make a hidden lace loop.

Lasting
Lasting is the operation that stretches the shoe upper over the foot form or last. Almost all shoes are lasted in some way. With the last inside the upper, the outsole can be bonded and pressed into place. Once the outsole is bonded, the shoe can be de-lasted. There are several types of lasting operations: slip lasting, board lasting, toe lasting, waist lasting, heel lasting, string lasting, California lasting, and hand lasting.

Lasting board
A fabric or paperboard sheet used to make the bottom of the shoe upper.

Lasting pressure
The lasting pressure is the amount of tension required to stretch the upper on the last form. Too much lasting pressure can damage, rip, or wrinkle the upper. Too little lasting pressure will result in a soft, ill-formed, baggy upper. It's up to the pattern master to get this right. Different materials will require different amounts of lasting pressure to look right.

Lateral side
The lateral side is the outside or the non-arched side of the shoe.

Linings of a shoe
1. Quarter Lining: horseshoe shape around back part of shoe
2. Vamp Lining: inside upper of forepart and toe of shoe
3. Sock Lining: covering all or part of the top surface of the insole.

Medial side
The medial side is the inside or arched side of the shoe. The outside is the lateral.

Midsole
The component of a shoe between the upper and outsole used to provide cushioning, fit, comfort, and support. Will be made of EVA or PU foam.

The shoe part: mudguard
The mudguard is the shoe pattern part along the forward part of the shoe along the edge of the outsole.

The shoe part: mustache
The mustache is the part attached to the shoe above the heel counter. The classic sneaker will have a mustache.

Outsole or sole unit
The bottom component of a shoe that provides grip and traction. The outsole is commonly rubber but can be high-density PU or EVA foam. Dress shoes may have leather bottoms.

Outsole channel stitch
The outsole will have a small groove or two molded into the rubber sidewall. After the shoe is assembled, a heavy-duty stitching machine with a special bent arm is used to stitch a heavy thread through the rubber sole and the upper of the shoe. This channel stitch is often used on the toe tip of joggers, the sidewall of skate shoes, and the bottoms of boat shoes.

Overlay
An upper part which is over another part. The Nike swoosh logo is an overlay part.

Padding
Refers to foam or other material, usually inside the collar or tongue, to add thickness/cushioning and improve fit. It is usually made of polyurethane, latex, EVA, or PE foam.

Parting line or outsole parting-plane
The line in an outsole mold is made by the closing edges of the tooling. The tooling is split at the parting line. A mold may have one or two parting planes. Extra rubber may spread out of the parting line; this will need to be trimmed off. A narrow, tight parting line or parting plane is a sign of quality tooling.

Pattern
The design of the shoe's cut parts. The shoe pattern is fit to the last. Designers and developers often make pattern corrections when creating a new shoe.

PU
Short for polyurethane. PU upper materials usually use a thin layer of PU foam with a non-woven or fabric backing for reinforcement and strength. PU can come in thousands of different colors and textures.

PU foam
Common padding inside shoe tongues and collars. Open cells allow air and water to enter. Can be very soft. Also known as KFF or K360 foam.

PU leather
A man-made material, often a composite made of two layers. A backing layer made of woven or non-woven polyester fibers combined with an external surface by "dry" lamination process or by "wet" liquid processes.

PU midsole foam
Another formulation of the Poly-Urethane material. In this case, foamed or blown into closed molds and used for midsoles, footbeds, and some upper cushioning parts. It can be heavier than EVA but is more elastic and bendable. Heavy-duty hiking shoes and work boots may have PU midsoles.

PU nubuck
A man-made material, often a composite made of two layers. A backing layer made of woven or non-woven polyester fibers combined with an external surface by "dry" lamination process. The top PU surface is slightly brushed to make a smooth matte finish. This is very common shoe material.

PVC leather
A man-made material often a composite made of two layers. A backing layer made of woven or non-woven polyester fibers, combined with an external surface by "dry" lamination process or by "wet" liquid processes.

The shoe part: quarter panel
The quarter panel is the main shoe pattern part on the side of the shoe. The Nike Swoosh, New Balance N, and the Vans V-Bar are all located on the quarter panel.

Sock or Sock liner
The sock, sock liner, footbed, or insole is the foam padded mesh on which your foot stands. It may be removable or may be cemented in. In high-end shoes, it will be made from molded EVA or PU foam. In low-end shoes, it will be made from die-cut EVA.

Split leather or suede leather
Split leather is the soft, hairy part of the animal hide. Suede is made by splitting the smooth surface off the top of the hide.

Stitch and turn (seam)
A seam that is stitched to join two parts, then flipped inside out, so the stitch is hidden. The stitch and turn seam is nearly always found where the shoe's collar meets the inner lining. This seam type is also used to hide material edges. To make the seam thinner, the edges are often skived before stitching, then the fabric may be hammered flat.

Strobel sock or Strobel board
The Strobel is the fabric or non-woven material used to finish the bottom of a shoe upper. The worker uses a Strobel machine to make a Strobel stitch to attach the Strobel board to the upper. It was invented by a guy named Strobel.

Suede leather or split leather
Suede leather is leather created from the fibrous part of the hide left once the top-grain of the raw hide has been separated from the hide. During the splitting operation, the top grain and drop split are separated. Suede is "fuzzy" on both sides.

Super tuff
Super tuff is a very common, non-woven reinforcement material, found in all types of shoes. You will find super tuff behind punched holes and metal hardware.

Synthetic leather
Man-made material, often a composite made of two layers. A backing layer made of woven or non-woven polyester fibers combined with an external surface by "dry" lamination process or by "wet" liquid processes.

Throat of the shoe
The shoe's throat is the opening where the shoe tongue is attached and is spanned by the laces. The throat is generally surrounded by the shoe's eyestay.

Toe box
The toe area of the shoe. Different styles will have different toe box sizes and shapes. Fashion shoes may have tight, pointed tips while work boots have extra space for steel toe inserts.

Toe puff
Toe puff is the reinforcing material used to hold the shape of the toe box. It can be thermoplastic, which is easily shaped with heat, leather, or fabric. It also comes in many styles, from soft to firm.

Toe spring
The toe spring of a last, shoe, or pattern is simply how much the front tip is off the ground. A stiff hiking boot may have a 15mm toe spring, while a slip-on casual shoe may have a 5mm toe spring. As a general rule, the stiffer the shoe sole, the more toe spring you need for a normal rolling stride.

Toe tip
The pattern part on the front of the shoe. Usually reinforced.

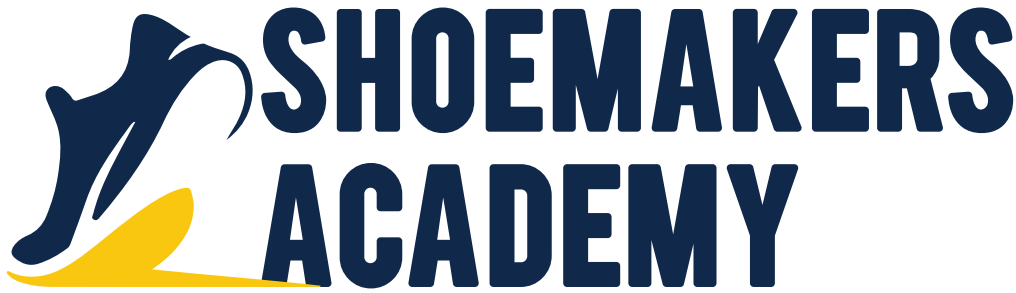
Top line
The top edge of the shoe's ankle opening.

Tread or shoe tread
The part of the shoe that contacts the ground. The shoe tread is most commonly made of rubber.

Vamp
The vamp is the area on top of the toes. The vamp is often made from breathable mesh or has perforations for venting.

Vulcanize
The process of heating raw rubber to cure it. This process creates crosslinks inside the rubber compound, bonding it together. Before the rubber is vulcanized, it is stretchable, gummy, and easy to tear. After being vulcanized, it's tough and ready to wear.

Wedge or midsole wedge
The EVA foam midsole of a shoe, thinner in the front and taller in the heel. When you use the word "wedge," you are usually referring to a die-cut midsole part.



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SNEAKER CONSTRUCTION 101

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TheShoeDog@ShoemakersAcademy.com

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