

Shoe Construction and Manufacture

Upper Materials

- Leather
 - Calfskin
 - Nubuck
 - Deerskin
 - Kidskin
 - Pigskin
 - Exotics



Upper Materials

- Natural fibers
 - Wool
 - Cotton
 - Hemp
- Synthetics
 - Nylon
 - Polyurethane
 - Vinyl



Soling Materials

- EVA
- Polyurethane
- Rubber
 - Crepe – a type of crude natural rubber sole characterized by a crinkled texture like crepe paper. Cushiony, but not durable.
 - Topy – thin rubber outsole attached to leather outsole.
- Composites
- Leather

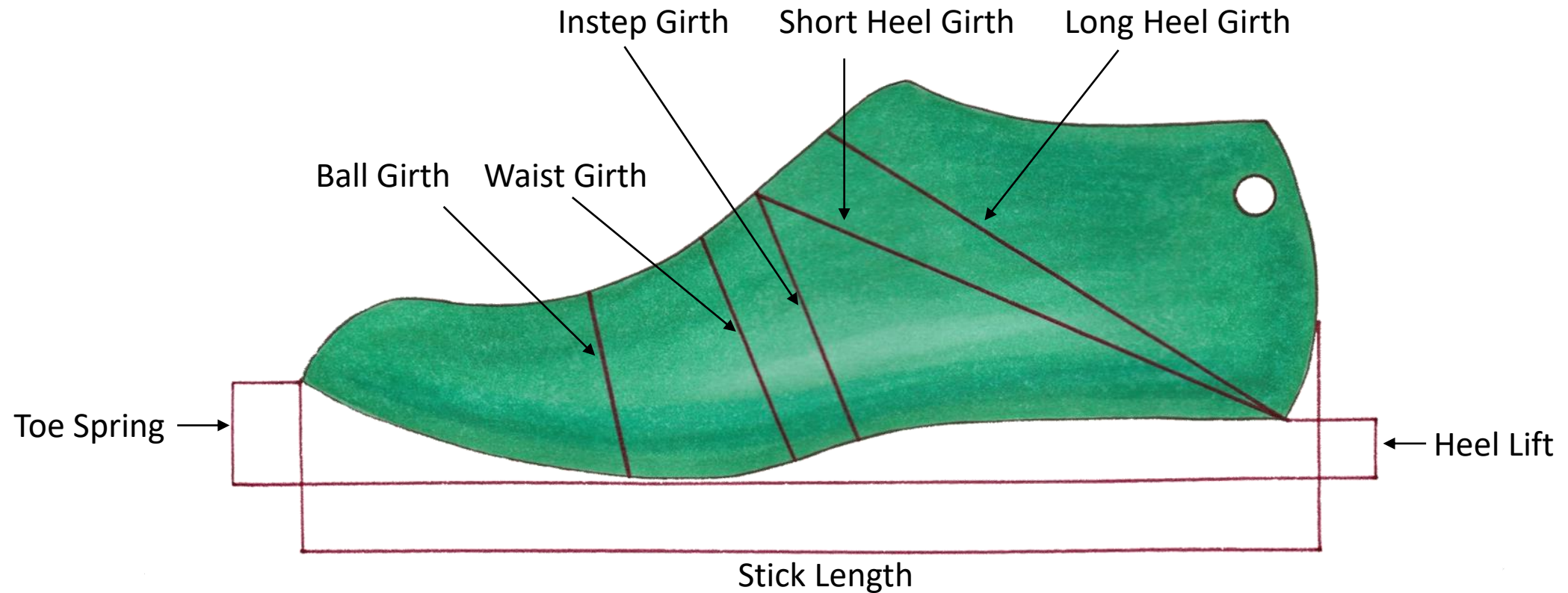


The Last

- 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 the foot form that is used to set the shape of the shoe.
- Can be made of plastic, metal or wood.
- Each different toe shape, size, width, and/or heel height requires a different last.
- Most of how a given shoe fits, feels and functions is determined by the last.
- Last designs are proprietary to the manufacturer.
- Shoes made of different lasts will necessarily fit differently...sometimes dramatically so.



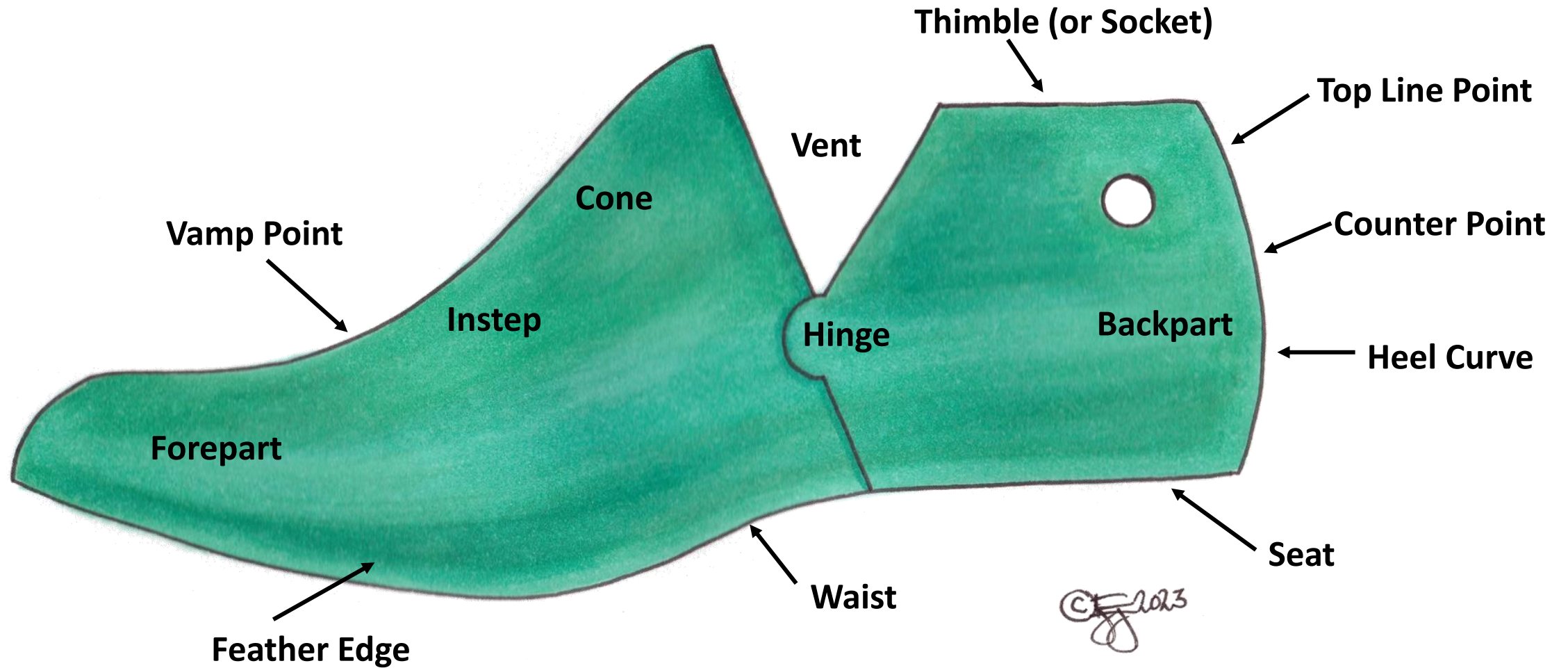
Last Measurements



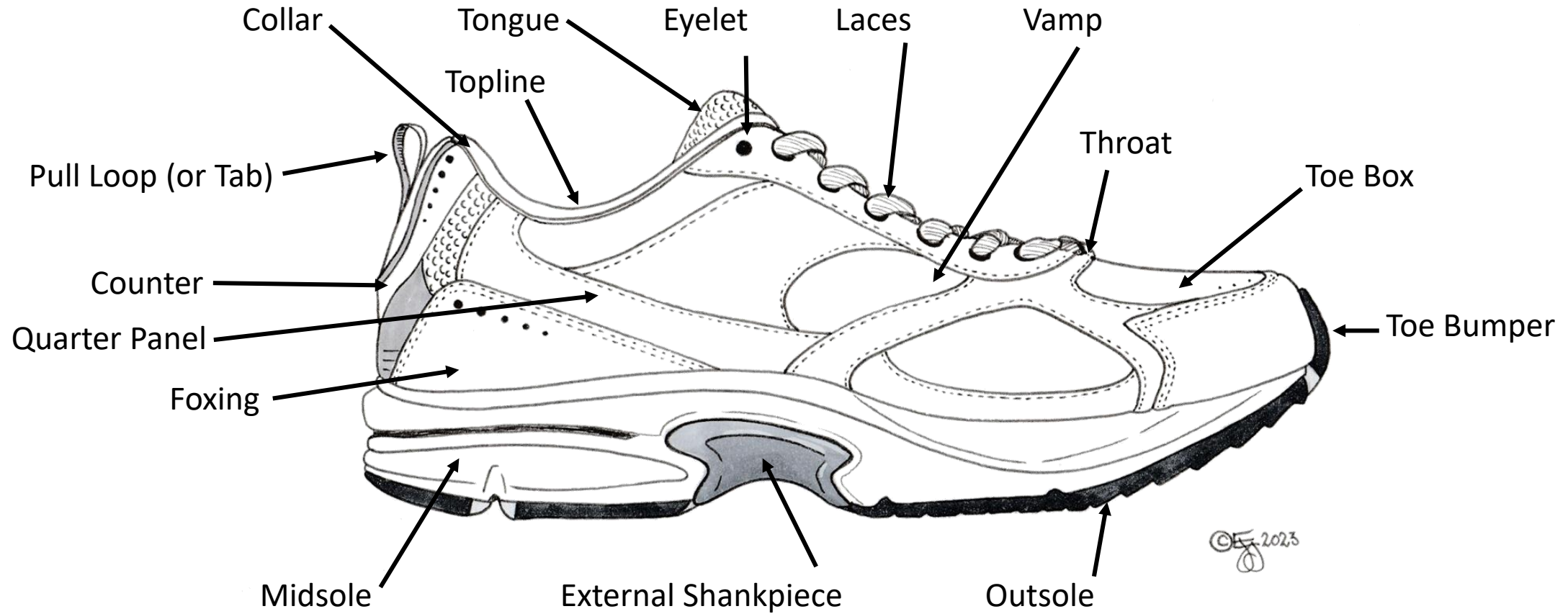
© 2023

(Girth – measured around the last with a flexible tape)

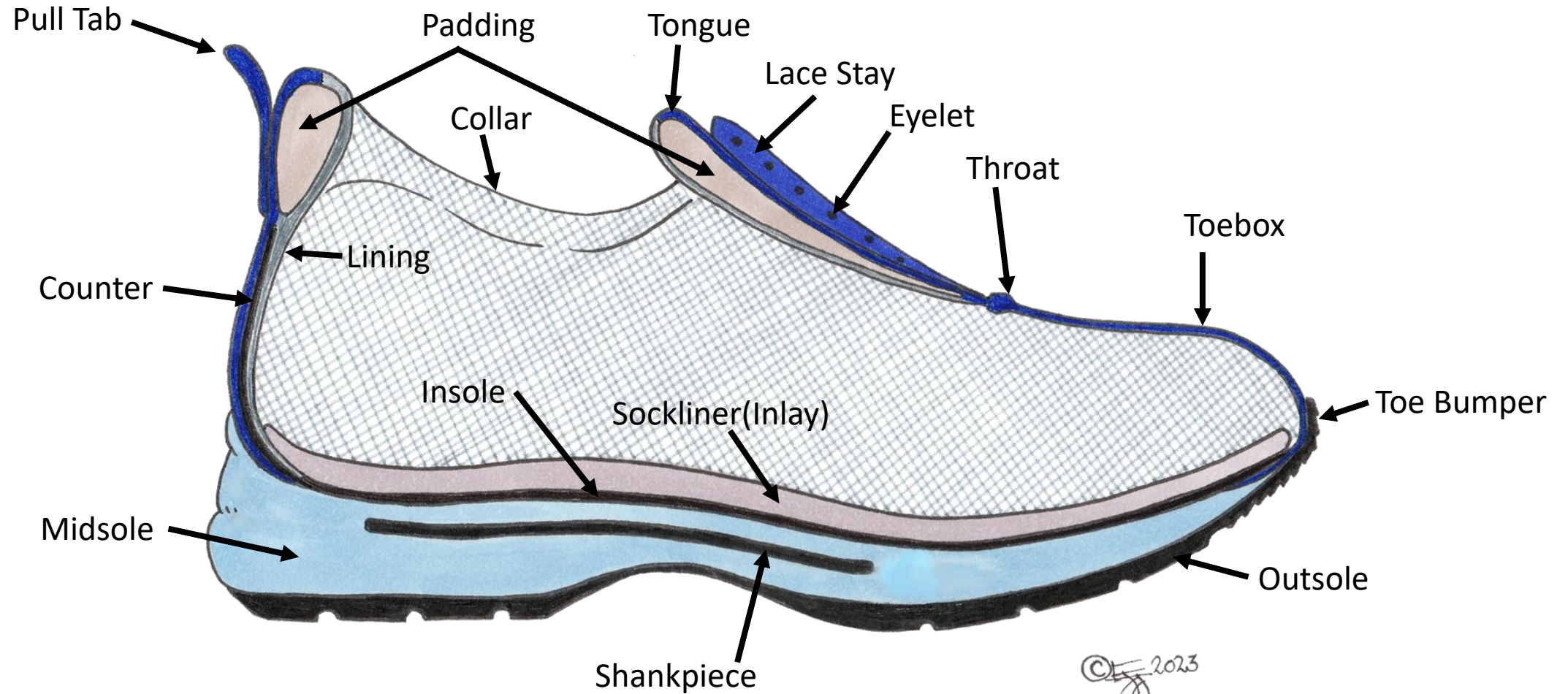
Parts of a Last



BASIC SHOE ANATOMY



BASIC SHOE ANATOMY - CUTAWAY

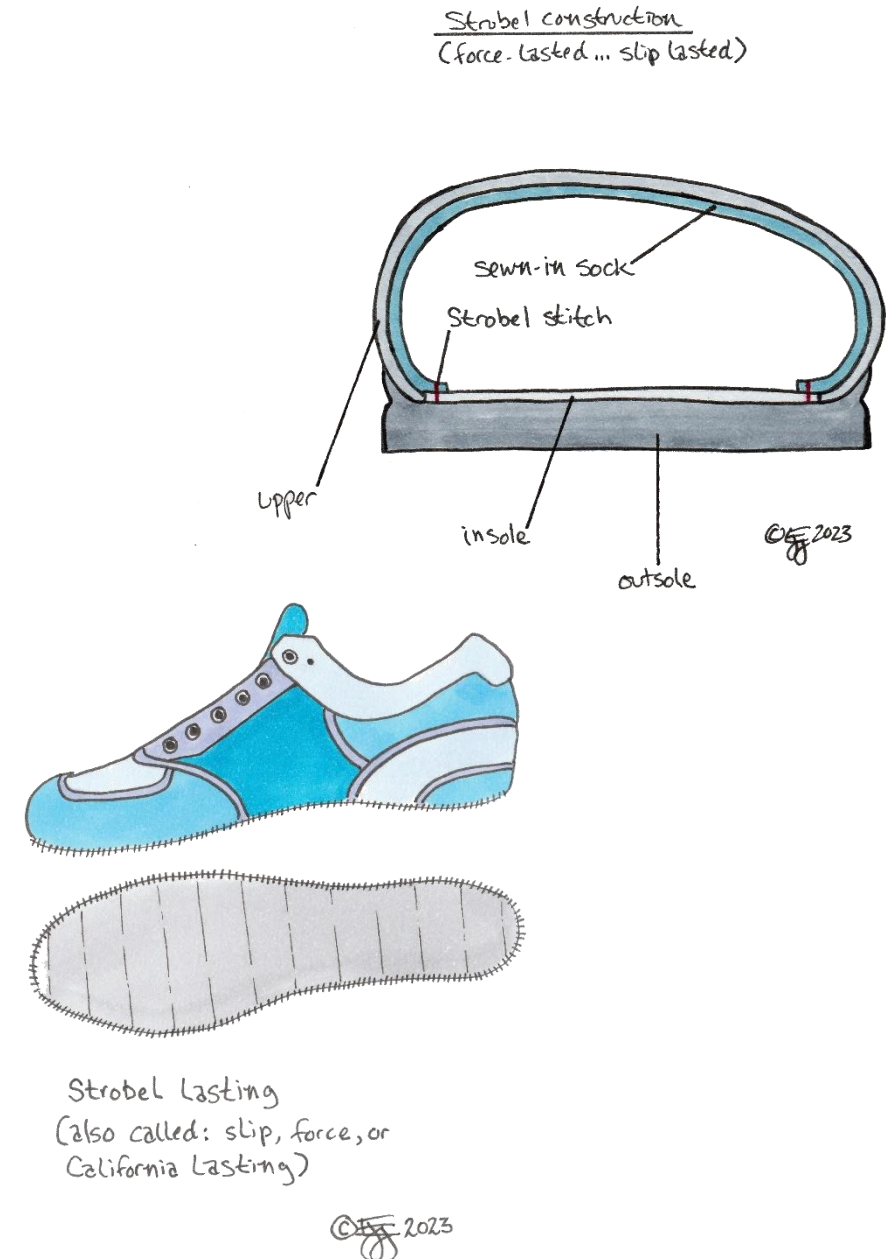


Lasting Techniques and Construction Methods

- 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 ideal shoe pattern fits the last tightly.
- The lasting operation will stretch the upper a bit, but not so much as to damage the shoe materials.

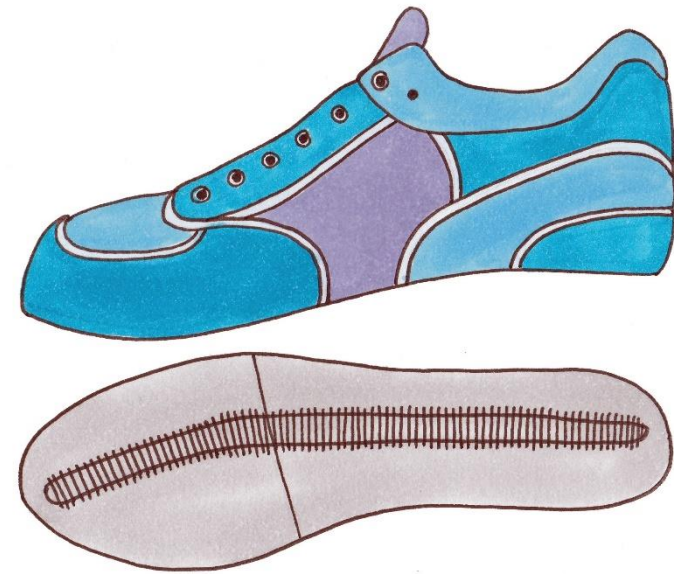
Strobel Lasting

- Strobel, slip, force, or California lasting is the most common shoe construction for casual and athletic shoes.
- Once the upper is complete, a “sock” or bottom material is added to “close” the upper. This material is non-stretch and is marked so the assembler can keep the upper straight on the last.
- As before, once the upper is heated and slipped on, it will be cooled to make the material fit tight. A machine assist may be used to make sure the heel is down tight.
- This shoe construction is used in almost every sports shoe.



Slip Lasting

- Also called Race Lasting, slip lasting is used to make the most flexible shoes. It is often used to make lightweight running or racing shoes.
- The shoe's upper materials, usually mesh and polyester, are left long and patterned to meet in the middle of the shoe.
- Once the sides are joined, the upper will be steam-heated and the last slipped in with the shoe being laced up tight.
- The upper is then cooled so it will tighten before the bottom is attached.

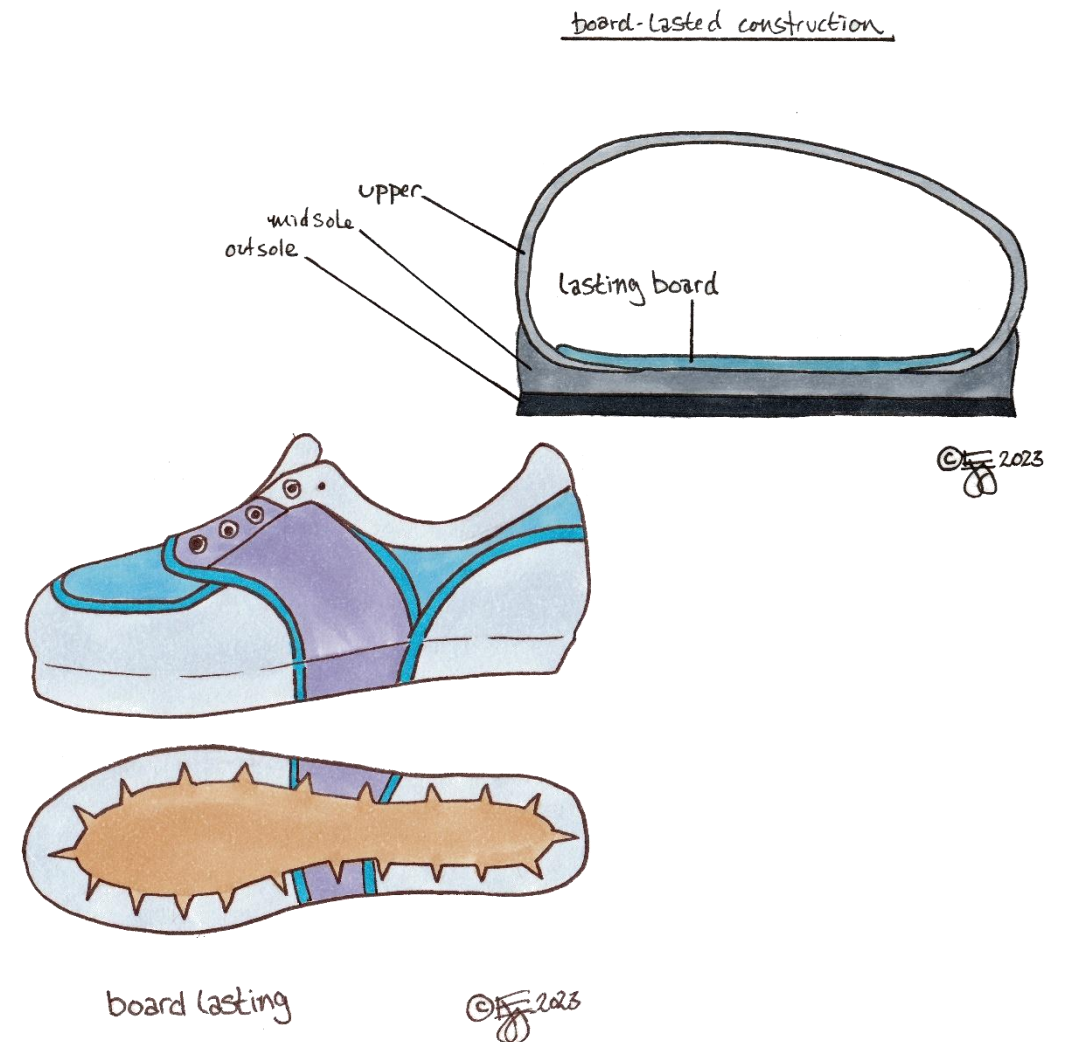


slip (or race) lasting

© 2023

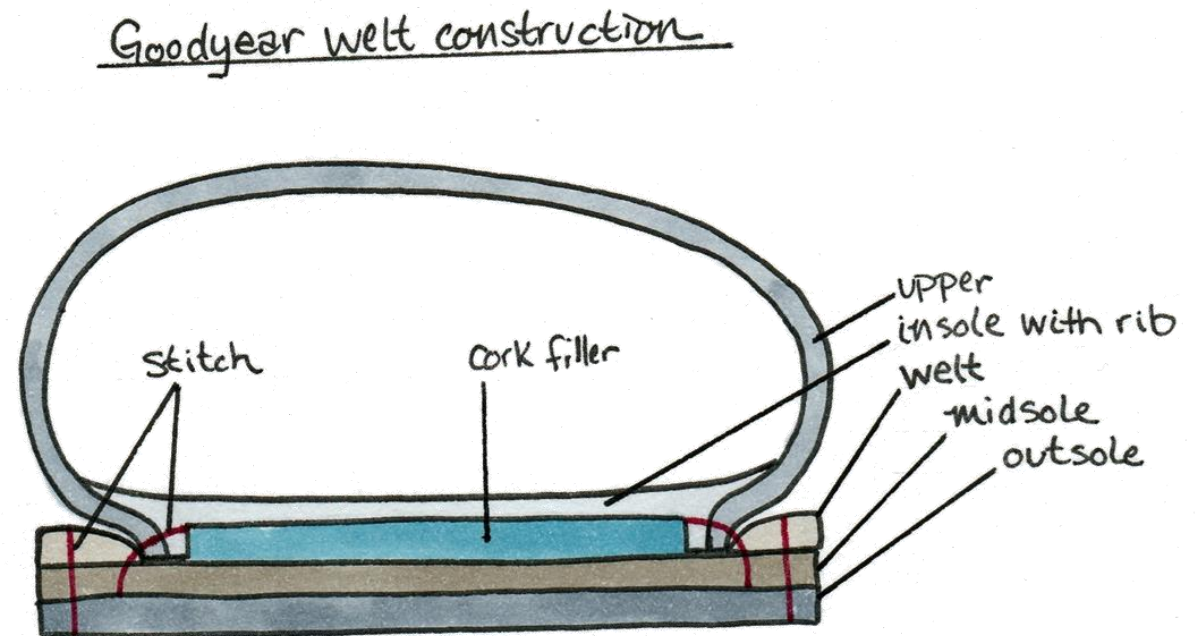
Board Lasting

- Board lasting is a very common process used to make military, hunting, hiking boots, or any shoe requiring a stiffer bottom and a steel toe.
- 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 (could have a metal shank inside).
- In one operation, the lasting machine pulls the upper tight around the last and injects glue between the upper and lasting board. A heel lasting machine and some hand pulling will complete the operation before the outsole is attached.
- Women's fashion shoes are made by board lasting. A delicate touch is required by the lasting machine operator to avoid damaging the uppers in the lasting process.
- Handmade shoes are almost always board lasted by hand.
- Board lasting shoe construction is also used to make the classic running shoe.



Goodyear Welt Construction

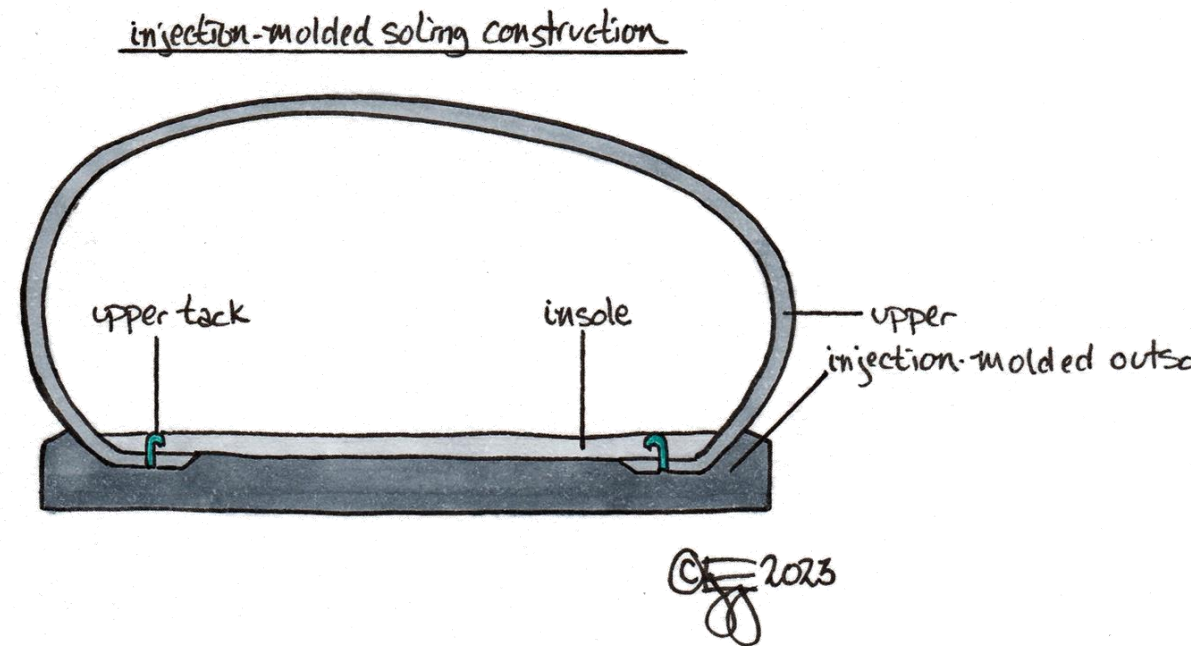
- A labor-intensive shoe construction, in which the upper and sole of the shoe are stitched together, resulting in greater durability and helps make the shoe or boot waterproof.
- The resulting seam is visible and runs around the outside of the shoe, where the upper and outsole meet. The feature that distinguishes this construction from all other is the perpendicular insole rib to which both the welt and upper are secured by a strong, flexible stitch.
- The Goodyear welt construction is unique in the position of its two seams in the shoe bottom. There is a hidden seam holding together the welt, the upper, the lining and the insole, which, in cross section, is almost horizontal in position. This is stitched with a Goodyear Welt machine.
- The outsole is then attached by means of a lockstitch sole stitching machine. This seam consists of heavy needle and bobbin threads which are drawn up tightly into the welt and sole.



© 2023

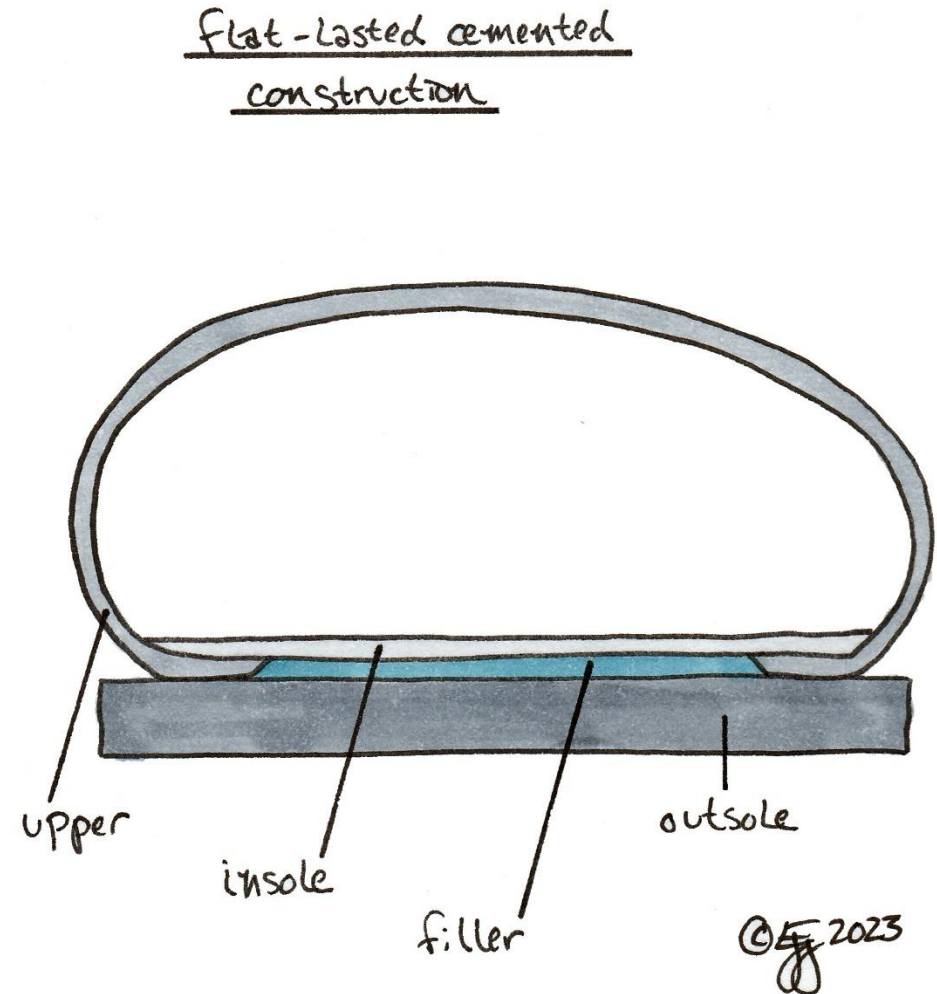
Injection Molded Construction

- A type of sole unit construction created by injecting melted PVC or a similar material into the sole mold. Injection molded construction is an efficient way to mass-produce footwear.
- The upper is placed on its last and then placed into the mold. The sole is formed around the lasted upper by injecting liquid synthetic soling material (PVC, polyurethane) into the mold.
- Vulcanization is a similar process using a slab of uncured natural rubber.



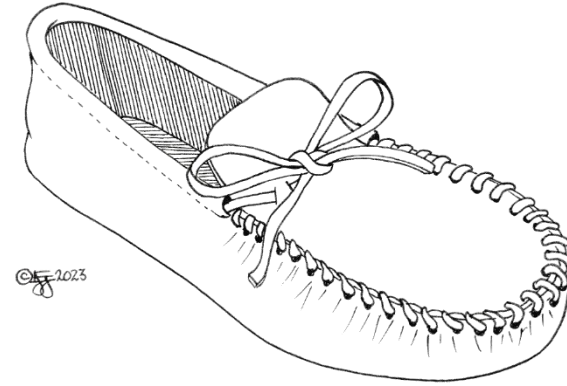
Flat-lasted Cemented Construction

- Overall, the most popular shoe construction in the volume footwear industry and the orthopedic footwear industry.
- Cement construction results in a lighter, more flexible shoe.
- The upper and insole are prepared and the upper is lasted. Adhesive is applied and the unit bottom sole is cemented, or “stuck on”, to the insole.

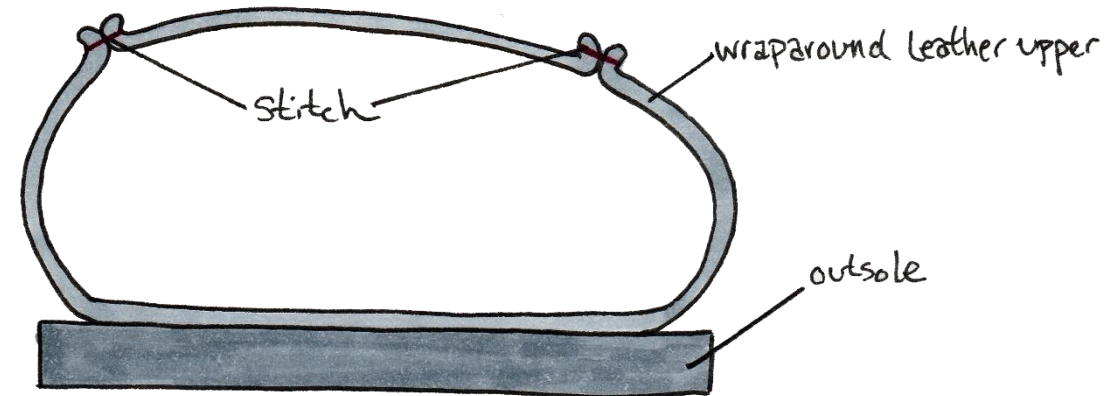


Moccasin Construction

- Thought to be the oldest shoe construction.
- Made with a specific wrap around construction.
- Consists of a single layer section of leather, which shapes the insole, vamp and quarters.
- The leather is molded upwards from the under outer layer of the last. Then an apron is sewed to the assembled edges of the vamp and the sole is stitched to the base of the shoe.
- Sometimes outsoles are just glued because it is cheaper and faster.
- Fake moccasins have a visual look of a moccasin but does not have the wraparound construction of the genuine ones.

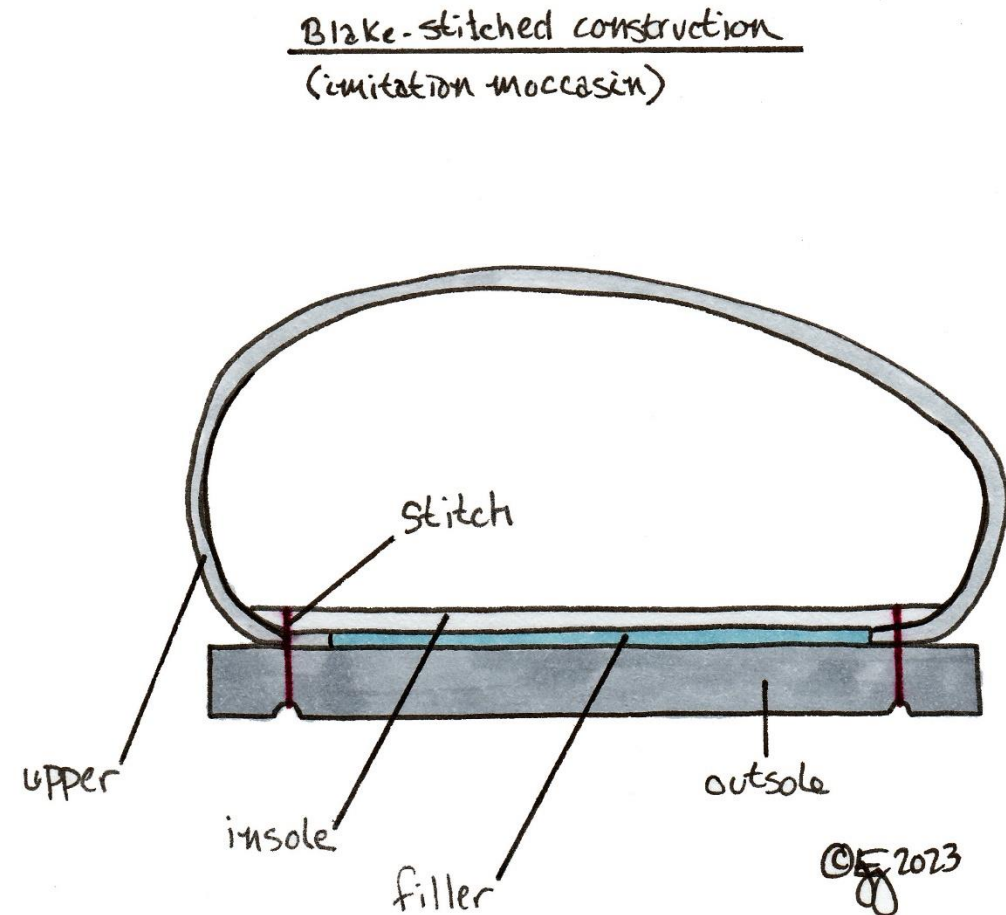


true moccasin construction



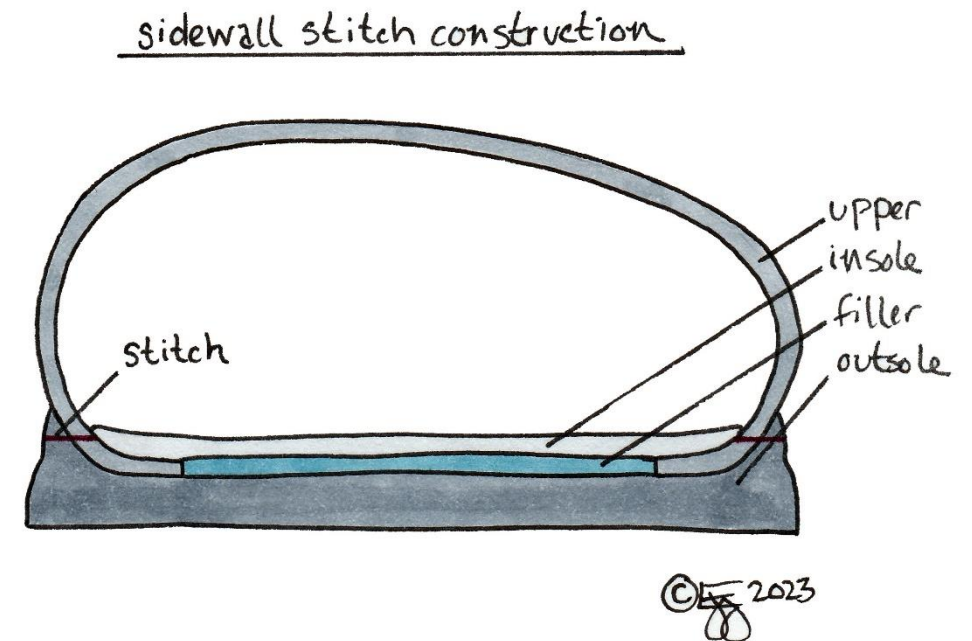
Blake-Stitched Construction

- Of the two primary welting methods (the other being Goodyear), Blake is the simplest and most common.
- It is a byproduct of the industrial revolution because the stitching is done on the inside of the shoe – making it impossible to do by hand.
- For a Blake welt, the upper is wrapped around the insole and attached between it and the outsole. A single stitch attaches everything together.
- It is more flexible than a Goodyear welt. It is also known as the McKay construction method.



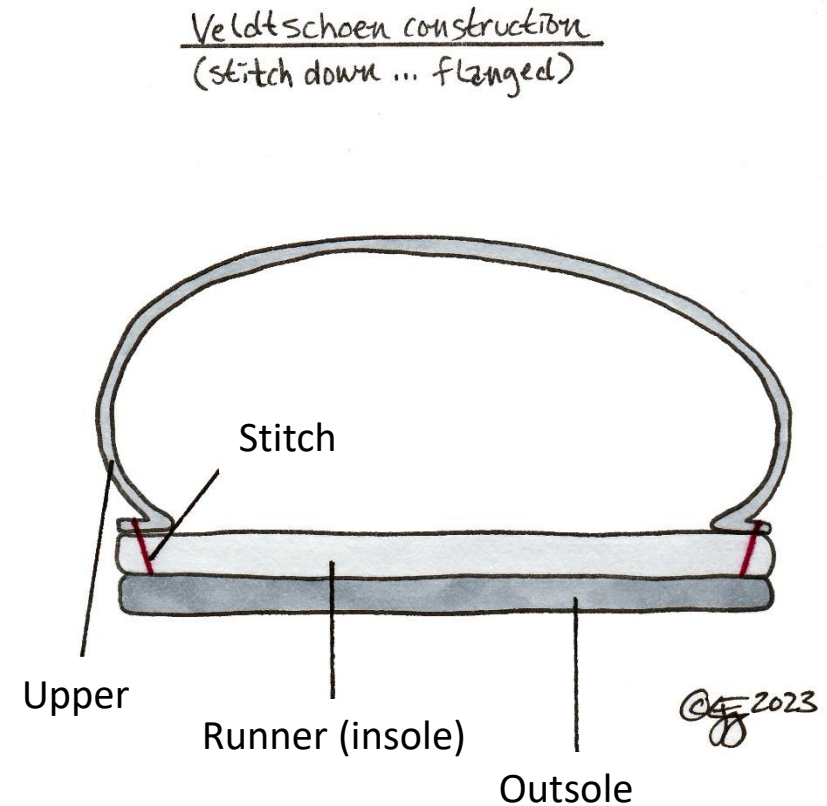
Sidewall-Stitched Construction

- Popular among today's sneakers, this is a construction method where the rubber sole is sewn into the upper with a so-called sidewall stitcher. The seam is at the top edge of the sole and runs around the entire shoe, and inside the shoe is an insole.



Stitchdown Construction

- This method utilizes a welt, but it is a simpler and cheaper construction than traditional welts.
- Also called Veldtschoen construction, this is the only method where the upper is flanged (turned outward) during the lasting process and attached by adhesive to a laminated “runner” that takes the place of a standard insole.
- After lasting, the upper and runner are lock-stitched together close to the feather edge.



Combination Lasting

- One reason to use the combination last method is to make a lightweight shoe stiffer. In this case, the forefoot is formed by Strobel, while the rear of the shoe is board lasted.
- This allows the shoe to have a shank or stiffer board in the rear of the shoes.
- For this type, a machine is used to “heel last” the upper, while the waist area may be pulled by hand with a pair of lasting pliers.
- This shoe construction is found in “support” shoes and light hikers.

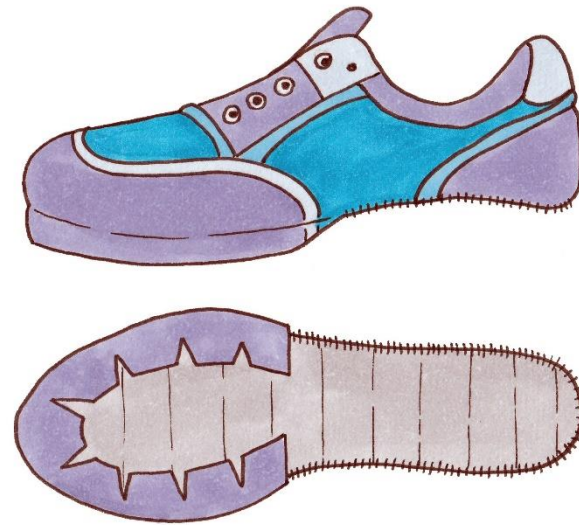


combination lasting - Strobel-lasting
forefoot + board-lasting hindfoot

© 2023

Combination Lasting

- For a shoe with a smooth, solid toe cap, the Strobel sock may be attached to the inner lining, and a lasting “skirt” may be left on the toe cap pattern part.
- Once the upper is lasted, a second machine operation is used to pull the toe pattern part down tight.
- This shoe construction is often used on light hiking boots and basketball shoes with smooth leather toe tips.
- Toe lasting allows the leather to be shaped with a lasting machine.



combination lasting - Strobel-lasting +
pulled toe tip

© 2023













GOLDEN WHEEL

吳紅梅
班電源及清潔

CS-8820
CHIT HANG INDUSTRIAL CO. LTD.











客户	诚隆
品名	361 中台
规格	20# 杜邦线





































龍泰塑膠製品廠
EVA 鞋墊
廣東省中山市三鄉鎮白石工業區
電話: 0760-6683736/6681740
傳真: 0760-6683737







The End