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Science Writing

Year 5-6

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SPORTS TECHNOLOGY: THE EVOLUTION OF THE RUNNING SHOE

The running shoe has changed and evolved over many years, from the early leather and rubber shoes with minimal support to the technologically advanced carbon plated super shoes of today. Scientific advancements in materials including foam and carbon fiber, as well as biomechanical research has drastically improved the performance of elite athletes as well as reducing injuries and decreasing recovery time.

1832

In 1832, Wait Webster had the idea to add rubber soles to a shoe or boot. This resulted in the making of plimsolls, a shoe largely worn by children.

1852

In 1852, some of the first spiked shoes were made by a company called Spalding. They had 6 spikes at the front of the sole.

1948

In 1948, Adolf Dassler, the father of the modern running shoe, founded the company known as Adidas. These shoes were used by some of the top athletes like Jesse Owens.

1960'S

Athlete Phil Knight and his coach designed a shoe with a cushioned heel wedge. Together, they created a company called Blue Ribbon Sports, later known as Nike.

1974

1974 was when Bill Bowerman created the Nike Waffle shoe, getting the idea from pouring rubber into a waffle iron.

2005

In 2005, both the Nike free fall, and Five Finger shoes were released. The Nike free fall was made for flexibility, and the Five Finger shoes were made to help runners land on the ball of their feet.

2016

The biggest innovation in recent years was when super shoes were introduced. In 2016 Nike introduced the first super shoes, known as the Nike Vaporfly 4%. These shoes have a carbon plate installed in the midsoles.

2020

In 2020, the rules around shoes were changed to allow supershoes.

THE SCIENCE BEHIND SUPERSHOES

Carbon fiber plated running shoes reduce recovery times and muscle fatigue. They can lower the chance of injuries to the knees, hips and ankles while increasing speed at the same time. Super shoes are made up of a thick but light foam midsole, and a stiff plate or rods in the midsole. Some shoes, such as the Nike Alphafly, also include air cushioning units in the midsole.

A thick foam midsole helps to cushion the landing of each step and provide more comfort, giving a high level of energy return. Every step a runner takes, their feet collide with the ground, often causing discomfort. Using these biomechanics, a thick but lightweight midsole compresses while landing which increases the time the runner is in contact with the ground, minimising the forces and impact. Also, the thick layer of foam which is often 35mm to 40mm essentially "lengthens" a runner's legs, improving stride length.

The carbon plate in a running shoe provides a stiff structure despite the soft foam cushioning. It works by reducing the upward bend of toes when running. This provides a longer lever for forward propulsion, increasing forward lean and stride length leading to an improved performance.

The first carbon plated shoes were released in the 1990s by Reebok, but it was said to be too stiff in the forefoot, gaining the wrong type of attention. Nike then adopted the style and changed it, forming the Nike Vaporfly 4%, released in 2017. Since the release, every world record from the 5km run to the marathon have been shattered, showing the impact these shoes have had on running.

Super shoes have been designed to improve running performances and recovery time by using technology and biomechanical observations. In recent years, these advancements have led to numerous improvements in elite performances. The continued evolution of running shoes is starting to incorporate 3D scanning and printing for fit customized to an individual's foot and running biomechanics. There is also the potential for shoes to contain smart sensors that monitor an athlete's running data. More recently, the push for sustainability has led to the use of recycled materials and more ethical and environmentally friendly production processes to be investigated.

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