The overall speed of movement during soccer competition has increased substantially over the past 20 years, but an individual player is in contact with the ball for only a few seconds throughout the duration of a 90-minute game. In addition to facilitation of ball handling, soccer shoes must support numerous other aspects of performance that are specific to a new style of play. The overall running distance per game is about 7–8 miles (10–12 km). Rapid changes in direction of movement and quick bursts of speed to cross 20–30 meters of distance now dominate the game. Frequently, split-second maneuvers determine which player will control the ball. In addition to traction, the weight of the shoes is an important performance factor, and different playing surfaces present different challenges. Natural grass, artificial turf, and arena grounds (gym floors) require specific shoe sole characteristics. A good soccer shoe enhances performance, while simultaneously protecting the athlete from injury.

**Key Points**

- Current soccer shoe designs reflect the sport’s evolution.
- Soccer has increasingly come to demand explosive starts, quick sprints, and rapid changes in direction.
- Synthetic materials have allowed for a significant reduction in weight.
- Current soccer shoe characteristics have few similarities to those of the champion’s shoe of 1954.

**Flexibility, Grip, and Cleat Geometry**

The shape and positioning of cleats should optimize stability of the foot and ankle joints and facilitate grip on the playing surface during cuts, turns, and quick changes of direction.

Biomechanical testing has resulted in a trend to replace 6-8 round cleats (Figure 1) with a greater number of thin and long elliptical-shaped cleats (Figure 2). Long cleats provide greater slip resistance on the lateral borders of the sole, but produce a suboptimal pressure distribution. Queen et al. found that shoes with fewer and longer cleats generated significantly greater plantar foot pressure than shoes with a greater number of shorter cleats. Combining traditional round-shaped cleats, which are widely popular with players, with thinner cleats has been done in an effort to realize the benefits of both types, which may be advantageous for acceleration. There is ongoing scientific evaluation of new sole and cleat construction that has been designed to facilitate more rapid changes of movement direction (Figure 3). There is conflicting evidence concerning the influence that such shoe characteristics might have on risk for anterior cruciate ligament injury.

For indoor soccer shoes, the combination of different types of rubber sole material provide resistance to foot slippage on the playing surface, while resisting shear forces.
that would otherwise lead to rapid sole deterioration (Figure 4).

**Stability**

Soccer athletes want a shoe that supports an aggressive style of play; however, a high degree of traction and rapid changes in movement direction may contribute to imposition of excessive stress on joints, muscles, and tendons. The soccer shoe is expected to deliver as much protection and stability as possible. The overall stability of latest generation of soccer shoes is derived from combination of differing materials that are used for construction of the outer sole, midsole, and upper components. The introduction of synthetic materials has allowed for incorporation of stabilizing components into the shoe upper, as well as connection of the outer sole, midsole, and upper components in a manner that permits them to function as a mechanical unit. Villwock et al. analyzed shoe stiffness on different playing surfaces and found that it was determined by the overall construction of the shoe. Torg et al. found that shoe construction and surface temperature influenced the shoe-surface interface release coefficient.

Analysis of a possible relationship between soccer shoe design and injury susceptibility is currently focused on the construction of the midfoot section of the shoe. Torsion of the midfoot, which was reported to have a high rate of occurrence in 2005, has been related to wearing shoes with a flexible sole in the midfoot area (Figure 5). Most manufacturers are now attempting to provide a high degree of flexibility in the area of the metatarso-phalangeal joints, while protecting the midfoot from torsion (Figure 6).

**Upper Material**

For decades, the upper material of soccer shoes was leather. In recent years, players, have shown interest
in shoes constructed from synthetic materials (Figure 7). Beyond the obvious benefit of weight reduction, new materials can provide the following advantages:

- Greater stability than leather over a long period of time and less variable qualities in different weather conditions
- Greater longevity (i.e., slower deterioration)
- More lightweight, even in heavy rain, and unaffected by humidity
- Ease of care
- Single-layer material allows for better ball control.
- Better integration of shoe components
- Stabilizing elements can be incorporated into shoe components.

**Shoe Center of Gravity**

Soccer shoe manufacturers recently experimented with the insertion of a weighted component into the midsole to alter the shoe’s center of gravity. By properly positioning a 10–40 g weight in the midfoot area of the midsole, the shoe’s center of gravity can be shifted toward the ball kick area of the foot, which can produce a 5% increase in kick power. The disadvantages of a heavier sole, however, may outweigh the advantage of the increase in kick power. A player who fails to reach the ball’s location before an opponent arrives will not derive any benefit from an increase in kick power. Consequently, the addition of a weighted midsole component has essentially disappeared from the market and has been replaced by a lightweight component that enhances kick power, and that may reduce injury risk (Figure 8).

**Children and Adolescents**

The soccer shoe industry has historically manufactured popular adult shoes in children’s sizes (i.e., simply a smaller version of an adult shoe), but the lesser body mass of a young player may make such a shoe too stiff. Soccer shoes that have been specifically designed for special needs of children and adolescents have recently been introduced.

Calcaneal apophysitis (Sever’s syndrome) is common among skeletally-immature soccer players. Although conclusive evidence is not available, development of this condition is believed to be related to practice duration, elevated vulnerability of the calcaneal growth plate to overuse stress before and during growth spurts, and poorly-fitted soccer shoes. Perhamre et al. reported good results for management of calcaneal apophysitis with heel cups, and Mündermann et al. demonstrated a reduction in injury incidence through the use of inserts that were used to improve shoe fit. These findings suggest that conformity of the shoe to anatomic contours in the heel area may reduce susceptibility to the condition.

**Summary**

The current design of soccer shoes seeks to provide ultra-light weight, optimal forefoot traction, and forefoot flexibility, while providing stabilization of the midfoot section. Many world-class players currently use the Adidas™ “F50 adizero” (e.g., Leo Messi, David Villa, Sami Nasri, Lukas Podolski, Karim Benzema, Arjen Robben, Eljero Elia, Ashley Young, Jermain Defoe, and Diego Forlan). Despite a very low weight of only 165 g, its traction and stability are comparable to other shoes that are much heavier. The Nike™ “Total90 Laser III” and “Mercurial Vapor V” weigh 230 g. Puma™ has also announced the availability of a low-weight soccer shoe.
The evolution of soccer shoes is an ongoing process, and many more new developments are anticipated in the immediate future.

**Tips When Buying Soccer Shoes**

1. Where will you use the shoes? What type of surface?
2. Test as many shoes as possible to find an optimal fit.
3. Pay particular attention to the fit of the heel portion. Good conformity between the contours of the heel and the shoe’s heel cup is a key consideration.
4. Feel around inside the shoe to detect manufacturing flaws or seams that could create excessive localized pressure against the foot.
5. When trying on shoes in a store, wear the socks that you will use when playing.
6. Assess the stability of the shoe by pressing the toe of the shoe against the ground; the shoe should flex in the area of the forefoot (metatarso-phalangeal joints) while maintaining stability in the midfoot area.

**Note.** Figures 1, 2, 3, 4, 7, and 8 were provided by Adidas™ with permission.

**References**


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