

# Carbon energy storage insoles

Does adding carbon fiber to shoe soles improve running economy?

Adding carbon fiber plates to shoe soles may not improve running economy. However, they do slightly alter whole-body and calf muscle biomechanics. In competitive athletics, marginal differences can distinguish champions from their competitors.

Why do athletes use shoes with carbon fiber soles?

Carbon fiber plates added to shoe soles increase the footwear's 3-point bending stiffness 12,13,15,17,24,25,28 and typically shift the athlete's center of pressure more anterior along the foot during ground contact 24,25,28,29. This is why athletes use shoes with carbon fiber soles.

Should carbon fiber plates be used in distance-running shoes?

There is a regulation trend among policy makers to limit the use of carbon fiber plates in distance-running footwear due to the belief that they provide an 'unfair advantage' over competitors without such technology 11. Despite the widespread use of carbon fiber plates in athletics 8,9,10,

Can a smart insole be a sustainable power source for wearable bioelectronics?

A total of 260 light-emitting diodes were lit up with perspiring feet and water on the floor, and a capacitor of 88  $\mu\text{F}$  was charged to 2.5 V in 900 s. This work represents a practical approach to developing a highly efficient and robust smart insole that can be used as a sustainable power source for wearable bioelectronics.

Do carbon fiber plates improve running performance?

Many athletes race with carbon fiber plates embedded in their shoe soles, in an attempt to improve their running performance. However, we sought to establish whether, and if so how, adding carbon fiber plates to shoe soles reduces athlete aerobic energy expenditure during running (improves running economy).

Does carbon fiber improve running economy?

Adding carbon fiber plates to shoe soles decreases the leg-joint's summed angular impulse during push-off 13, which is often considered an indicator of running economy. However, this decrease in angular impulse can be achieved by increasing peak torque and shortening durations 18,19,20. The studies suggest that this approach may actually worsen running economy.

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