

Material and Subject Test of Sports Shoes

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ABSTRACT

The primary functions of sports shoes are to promote the athletic performance and decrease the occurrence of sports injuries. A shoe with good cushioning ability can prevent the injuries, and one with good energy return ability can enhance the performance. Thus, most of tests for sports shoes focused on the cushioning and energy return ability. Two approaches were applied to test twenty new athletic shoes with various sizes in this study: (1) Material test- SATRA shoe testing instrument was used to measure the deceleration and rebound height of the impact striker, (2) Subject test- eight male subjects were asked to perform different ambulation with barefoot and different footwear conditions. Vertical ground reaction forces were measured using force platform while walking, jogging and sprinting. The heights were measured while the subjects perform the vertical jump. In the material test, the peak decelerations were about 10 ~ 12 g excluding volleyball shoes (23g), the rebound heights were about 43 ~ 47%. In the subject test, the impact force peaks had no significant difference among the six footwear conditions, but the maximum loading rates for barefoot condition were significantly larger than those of other five footwear conditions. Therefore, using the maximum loading rate could better evaluate the cushioning ability of sports shoes compared to the impact force peak. The heights of vertical jump had no significant difference among six footwear conditions. Although the results of statistical analysis in the material and subject tests were not totally agree, they had the same tendency. Furthermore, they can be applied to test shoes in different approaches. Material test can show the mechanical characteristics of the soles quickly and save the testing time, so commercial shoes could be evaluated using the material test. Subject test is time consuming, but similar to real conditions, so a particular shoe designed for individual such as athlete or patient should be evaluated using subject test.

Keywords: sports shoes, cushioning, energy return, material test, subject test