

Total Toe – The foot expander

Training device for athletics and everyday activities

Invention

In athletics and everyday activities, the human foot needs to perform as well as possible without injury and to hold up under high loads. During a normal day, it has to bear up to 600 t. In competitive sports (such as marathons), this load can rise to more than 4000 t. At the highest levels of athletics, peak loads rise to ten times body weight. These forces often overload the foot structures. Tendonitis, plantar aponeurosis inflammation, permanent deformity of the toes and longitudinal arch, and even metatarsal fracture can result. Weekly training with Total Toe strengthens foot musculature, improving athletic performance and preventing foot injuries. Total Toe builds up toe musculature in a targeted manner. Muscles contribute to propulsion, stabilize the foot-ankle complex, counteract bending loads to the metatarsal, and transmit force from the large leg-extending muscles (hip, knee, and foot extensors) to the ground or floor. The device is being used at the highest levels of athletics (German Bobsleigh, Luge, and Skeleton Federation; Germany's top professional soccer league; and competitive dancing). Other effects: If the muscles are well-trained, they can relieve the Achilles tendon and plantar aponeurosis and counteract fallen arches and flat feet. Muscle contractions also support venous return to the heart from the lower leg, preventing thrombosis caused by long periods of sitting (at a desk or on a plane, for instance).



Training device for strengthening short and long toe musculature. The toes are pressed down against the pulling resistance of the rubber cords (shown here in green). There are a variety of resistances, and the cords can be replaced as training progresses.

Commercial Opportunities

There is a large target group in Germany: The German Olympic Sports Confederation (DOSB) estimates that about ten million people are active in competitive sports. In Germany alone, about two thirds of the population play sports regularly or engage in physical activity in their leisure time. No comparable device is available on the market.

Current Status

Development for the training device (Patent DE 10 2014 113 458 B3) proceeded from a number of scientific studies on strength ability and functional adaptation of toe-bending musculature in physically active individuals. Diabetic patient examinations have documented clinical utility for strength training for this muscle group. Prototypes have been created from aluminum, wood, and plastic. Manufacturing data are available as a CAD file, allowing the devices to be milled, cut, or lasered from the desired material in automated manufacturing systems. The various rubber cord resistances allow training stimulus to be adjust to nine different progress levels. The training device was chosen for first place in the "Technologies for Healthy Movement" innovation competition at the German Sport University Cologne by an external panel of expert judges. On behalf of the German Sport University Cologne, we are offering interested companies the opportunity to license this technology and cooperate with the inventors in its refinement.

An invention from the German Sport University Cologne.

Competitive Advantages

- Proven efficiency increases
- Patented invention
- CAD production data available
- Simple handling

Technology Readiness Level

1 2 3 4 5 6 7 8 9

System prototype
demonstration in operational
environment

Industries

- Training device
- Sports industry
- Therapy and training

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