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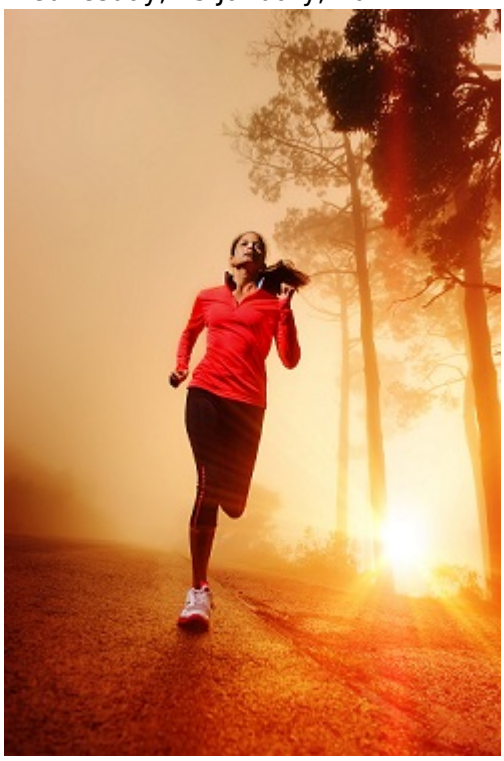
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Jogging or running is a popular form of physical activity. However, the resulting repetitive stresses and strains on joints can cause injuries. In fact, many joggers have to stop practising the sport because they tend to land on their heels which, when done for miles on end, produces impact forces which are simply too much to bear for the legs and back.

In an effort to avoid such injuries, Dutch entrepreneur Adri Hartveld has reinvented the running shoe. His invention does away with the heel and replaces it with a shock plate which distributes the force across the foot while running, therefore encouraging a natural foot strike, just like barefoot runners and elite athletes.

“HEELLESS”, as the shoe concept is aptly named, prevents joint injury and muscle overstrains by lessening the impact of the foot striking the ground during running.

Preliminary trials had already proven Hartveld's concept, but methodical research was needed and this is where the European Union (EU)'s contribution of nearly €1 million came in. The two-year project that began in September 2008 saw an SME consortium from the Netherlands, the United Kingdom, Germany, Spain and Poland carrying out an independent analysis via a myriad of tests to further improve the shoe.

The data collected shows how the lower limb joints and the muscles in the HEELLESS concept shoes work in comparison to conventional running shoes. The composite materials that will be used in the

rigid upper sole will set a new precedent for the market. Using a combination of flax and carbon fibre to protect the body from repeated shock forces is a first in the world for footwear. The use of a natural fibre reinforced composites has both performance and recyclability advantages. *"The research showed that natural fibre reinforcement can be applied to footwear and scaled up to make the worldwide manufacture of shoes more sustainable",* says Hartveld.

Hartveld knows he faces a challenge convincing sports shoe companies to buy into his idea. But he says the feedback received has been good. *"When people try them on for the first time it just takes a few steps to get used to them. There is surprise about how stable and how much more bouncy the shoes are with many people saying they are inclined to walk fast and get into a running stride quite quickly."*

On top of this, the market for athletic footwear is substantial with consumers becoming increasingly aware of safety factors and the prevention of injuries. In fact, the EU is the largest market for footwear representing one third of the global market consumption of € 147 billion with an average per capita expenditure of € 100 or 4.2 pairs. The HEELLESS concept and the advanced fibre-reinforced materials developed around it provide an opportunity to compete with East Asia by providing high value-added products. The exploitation outlook is thus promising, not only in targeting performance runners, but also the fitness market as a whole.

To succeed, the safety and the validity of the concept had to be assessed. The contracted research partners in The Netherlands, UK and Germany have already demonstrated that replacing the heel with a shock plate is both safe and effective. Patents of the footwear concepts have been granted in Europe, and are pending in the US. Recently, major shoe brands showed an interest in using this technology and have started to test the technology themselves.

In order to use natural fibre reinforcement, further research is needed, but the project has nevertheless made good progress. *"I think this is just the start of a thriving European industry in natural fibre reinforced composite plates for footwear. Such parts will be produced for millions of shoes to help improve the posture and fitness of the world's population. We have focused on the sustainable manufacture of footwear to reduce its environmental footprint. And working with our partners in Europe has indeed given us the opportunity to study and develop both the health and environment benefits of an exciting new technology,"* Hartveld concludes.

Related article: *Wireless* 'smart trainers' give real-time advice [2]

See also:
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Project:
Development of a heelless shoe to reduce injury during running
Project Acronym:
HEELLESS

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