APPLIED BIOMECHANICS: FOOTWEAR INDUSTRY

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ABSTRACT

FOOTWEAR INDUSTRY

Due to the strong pressure in the global market and the impossibility of competing against prices from low cost countries, our industry needs to offer added value products. From the functional point of view there are several strategies being followed:

Functional design improving footwear for specific activities: This applies especially to professional and sports footwear. First, the functional requirements need to be defined. Ideally this is done by observational analysis, interviews and questionnaires and biomechanical analysis of the tasks being performed most, or being critical for performance or injury prevention. Then possible solutions to meet these requirements are sought, some approaches are tested and finally implemented.

Smart shoes: meaning adaptive footwear using smart materials or embedded technology (thermal control, comfort, health) and sensorised footwear for providing some kind of feedback such as activity monitoring or footwear status.

Functional customisation: meaning footwear fit for the individual and the purpose of use, based on individual biomechanics and activity. The SSHOES project (www.sshoes.eu) aims at an ultimate goal of the footwear industry: Being able to provide customised footwear, adapted to the client's particular anatomy and motion patterns during the activity for which the footwear is intended. Some of the milestones to achieve this are: Developing an inexpensive laboratory and a fast and easy protocol for gathering the client's information, transfer and integrate that information into the design and finally a solution for the "in series production of customised footwear". The SSHOES project has narrowed the commitment, confining it to diabetic feet and the prevention of first metatarsal or hallux ulceration. If the project succeeds, the same procedure should be applicable to most of the other customised, functional or fashion designs.

The knowledge on the interplay between design features and biomechanics and even on what biomechanical outcome should be targeted is quite scarce. At this stage no fully automated solution from the measurement of parameters to the final shoe would be realistic. The aim is offering a "Knowledge Based" (KB) guidance tool that helps taking decisions about design characteristics, materials available, etc. This relies on CAD systems supported by open architectures of meta-data capable of providing parametric designs of lasts, insoles and outsoles for specific feet, considering biomechanical parameters as well as other shoe and material related features.

The final goal is an engineering framework for the full automation of product manufacturing going from the patient to the final product manufacturing.

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