

Why convex?

## New forefoot section for lasts

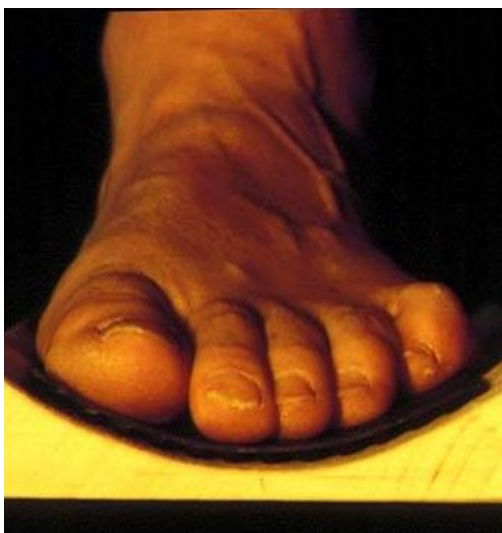
***In general, the forefoot section of industrial lasts is convex. Wait, convex? This means that the forefoot part of the shoes which made over these lasts does not follow the shape of the human forefoot anatomy at all.***

***The ISC project "Ergonomic Last", funded by the Arbeitsgemeinschaft industrieller Forschungsvereinigungen (AIF), raises the question of whether a differently shaped forefoot could be more advantageous for the shoe wearer; it concerns the development of an innovative last shape considering the specific anatomical and biomechanical conditions of the forefoot. The results are already available since mid-2018.***

Within the framework of the "Ergonomic Last" project, innovative last shapes were developed and tested. The aim was to show how the lasts can be improved constructively for industrially manufactured shoes as well as for individually custom-made and orthopaedic shoes. The aim was to design shoes in such a way that they would

- 1) keep the foot permanently healthy and thus have a positive effect on the entire musculoskeletal system, and also
- 2) support the foot in its function and performance (efficiency; in the sense of ergonomics).

In contrast to the conventional last, whose sole is convex in the forefoot area contrary to the physiological anatomy of the forefoot, the desired new last shape should have a flat forefoot area, which should serve as a foundation for a foot-ergonomic last design.



*convex surface (Picture: Dr. Norbert Becker)*



*even surface (Picture: Dr. Norbert Becker)*

Using biomechanical, optical and physical measurements, the requirements and effects of the new last shape were examined at every stage of development. Wearing tests over several weeks were planned. During this time, the project team determined at regular intervals the changes in the biomechanical parameters and as well the persons' statements about their subjective wearing sensation. A flat support surface for the forefoot around the ball of the foot, redesigned from a biomechanical point of view, is an innovation in last construction. The project showed the practicability both on model lasts and on shoes manufactured over them. In this way, the prerequisites for SMEs to adopt new, ergonomically optimised last shapes or to adapt to their own products are created. The ergonomically optimized wearing comfort represents a sales argument with which shoe manufacturers can set themselves apart from the competition.

The project has the AiF project number 18960N. It started on 1 December 2015 and ended on 31 May 2018.

The project was managed by the ISC; the PFI was the second research centre.

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