

# Camper uses biomechanics to make comfortable shoes

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Until now biomechanical studies had only been used with sports shoes but not with urban shoes. Credit: CREB

Researchers from the Polytechnic University of Catalonia (UPC) have carried out a biomechanical study of the footwear made by Camper. A group of 54 volunteers took part in the project, trying on six models of men's shoes and six models of women's shoes. They were analysed using

optical motion capture systems, force plates, pressure insoles and electromyography sensors. The purpose of the study was to establish the parameters affecting the comfort of the shoes made by the Balearic firm.

Software created by biomechanical engineers is being combined with the old skills of shoemakers to make comfortable shoes. Camper has started using parameters based on algorithms obtained by a group from the Biomedical Engineering Research Centre (CREB) at the UPC.

Josep Maria Font, director of the division of biomechanics at the CREB and leader of the project, explains to SINC that the initiative is the first of its kind. Until now this type of biomechanical studies has only been applied to sportive footwear but not to urban shoes.

The aim of the project "is to establish which parameters have an effect on the comfort of Camper shoes. We have achieved this using physical measurements taken at our biomechanical laboratory and conducting surveys to find out more about user perception", says Font.

For the study, the researchers worked with 54 volunteers who tried on six models of men's shoes and six models of women's [shoes](#), which were analyzed using the sophisticated equipment from the Biomechanical Laboratory at CREB.

The instruments used included pressure insoles placed between the foot and the shoe to record the pressure applied to the foot. Force plates were also employed. These permitted the measurement of the contact forces between the ground and the user when walking. An optical motion capture system was also used. This consisted of 18 cameras, permitting the movement of the person's legs while walking to be monitored at any moment, explains Font.

The researchers also used electromyography sensors, electrodes that record the activity of the muscles in the human body. "In this case –continues Font– we focused on the movement of the ankle joint, as this is the closest to the shoe. On the basis of this electrical measurement we have also been able to establish how much muscular activity is required when using one shoe or another".

## **Tests with volunteers**

The project leader says that on completion of the tests with volunteers, a statistical analysis was made of the physical measurements and key parameters were obtained. These include a template of the angle of the ankle or knee, calculated using mechanical engineering algorithms.

"With this information, the statistical data and the results of the survey, we were able to determine which parameters were more closely linked to the comfort perceived by the user".

The CREB, which forms part of the Centre for Innovation and Technology (CIT UPC), is currently exploring the possibility of starting similar studies to the one underway at the moment with Camper with other brands from the footwear industry.

## **Mathematical models**

The project started in 2012 and has now entered the second phase. According to Font, Camper, a longstanding shoemaker's, has a lot of knowledge about shoe's comfort. "With this study the firm wants to improve this knowledge using a scientific approach which could be measured objectively using mathematical models".

Therefore, when Camper wants to launch a new shoe model to the

market, it can first take the shoe to the CREB laboratory, where the parameters determining its comfort can be measured. "This will provide the company with tangible references and data that will enable them to objectively improve new models", concludes the researcher.

Provided by Plataforma SINC, Spain

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