

APPLIED BIOMECHANICS



FACTS

Developing wearable devices such as prostheses, orthoses, complex exoskeletons or sporting goods requires a broad understanding of human biomechanics and its individuality. To achieve a successful product development, high-quality captured human motion has to be taken into consideration.

Questions:

- Which biomechanical data is relevant for my product?
- How can I evaluate my product in a biomechanical way?
- How do human and technical development interact?
- Is my product optimally designed to withstand occurring loads?
- How can I get the optimal solution based on my first ideas?

OUR COMPETENCIES

For over 15 years, the interdisciplinary team of department “Biomechatronic Systems” of Fraunhofer IPA is working on designing and testing prostheses and orthoses.

Motion Lab

An area of 90m² is prepared for widespread analyses in the fields of clinical gait and motion analysis, prosthetics and orthotics, ergonomics or sports biomechanics. Human motion and forces are captured, analysed (e.g. calculation of joint forces) and prepared for further use (e.g. forward dynamic simulations). A modular floor system enables a variable positioning of force plates over the entire floor area as well as a methodical optimal integration of additional installations (e.g. stairs, ramps, working environment).

Engineering, Simulation & Design

While engineering and design, results of motion analysis are taken into consideration and are combined with modern manufacturing procedures. Thus, fast developments and set-up functional models can be ensured. Functional models and prototypes can be tested based on their individual loads and can be combined with simulations for evaluation and optimization.

Test Lab

Simplified loading tests can be performed by a compression-tension test system. Prostheses, orthoses as well as shoes are tested with a position- and force-controlled test rig based on ISO 22675. Complex 3-dimensional load situations and dynamic motion sequences can be simulated by means of a robot. Individual human motion and load are transmitted directly to the robot. This provides a realistic reproduction of the load by use of the robot.

OUR RANGE OF SERVICES

- Analysis of human motion
- Examination in human engineering and ergonomics
- Biomechanical evaluation of devices
- Design and engineering of wearable devices
- Individualization in design, engineering and testing procedures
- Combination of human motion and mechanical test procedures

YOUR BENEFIT

As a neutral and independent partner, we support you in the implementation of your project in a competent way:

- Application-oriented
- Based on science
- Target-oriented

We plan and realize technical products around the human being:

- Innovative approaches
- Modern ideas
- Close to the product

We assimilate to your individual needs and offer the full range of development:

- Conception and creation of ideas
- Calculation and engineering
- Design and simulation
- Testing and validation

Our interdisciplinary team with its wide range of experience is at your disposal:

- Knowledge in theory and application
- Experts in fields of physical therapy, bioinformatics, sports sciences, design, mechanical and medical engineering

CONTACT

Fraunhofer Institute for Manufacturing Engineering and Automation IPA

Nobelstrasse 12 | 70569 Stuttgart | Germany
www.ipa.fraunhofer.de

Director of Institute

Prof. Dr.-Ing. Thomas Bauernhansl

For more information about our range of services as well as individual advice, please contact:

Department

Biomechatronic Systems

Contact

Florian Blab
Phone +49 711 970-3661
florian.blab@ipa.fraunhofer.de

