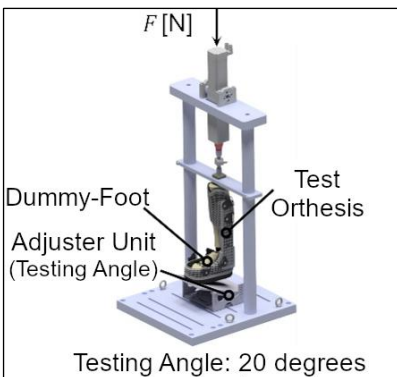


Dummy foot

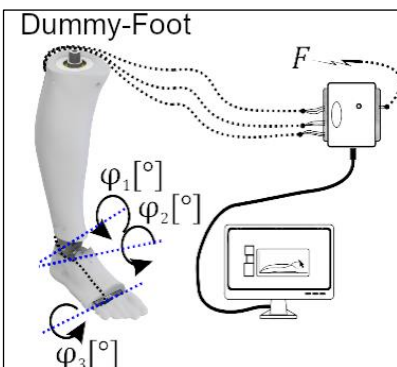
A test procedure for orthoses of the lower extremities

Invention

Orthopedic treatment of the lower extremities offers various approaches in terms of patient care with the use of technical, medical aids, e.g. lower leg relief orthoses for immobilising the foot or alternatively, dynamic foot lifter orthoses. In addition, the final device can be manufactured either industrially or by hand. However, regardless of the approach to patient care, there is a lack of evidence of disease-related effectiveness for many



Test setup: Orthosis in test stand



Dummy foot with three joint axes

clinical patterns. The evaluation of the functionality, and thus the success of the treatment, is mostly dependent on the experience of the responsible orthopedic surgeon and/or orthopedic technician. Inadequate fitting and functionality can for example, lead to amputation, e.g. in the case of diabetic foot syndrome. The aim of the the fitting is therefore to enable sufficient effectiveness of the orthosis. The effectiveness is to be proven by test procedures, so that the additional costs that may be associated with this, are covered by the health insurance companies.

In the case of diabetic foot syndrome, testing the stiffness of the orthosis is especially necessary in order to ensure adequate immobilisation. In order to be able to make a statement concerning this, the orthosis is put on a dummy foot. This dummy foot is individually adapted to the leg of the respective wearer. The movements of the natural joint axes of the corresponding foot can be evaluated sensorially. For individualisation, a 3D scan of the patient's leg is made, on the basis of which the individual parts of the dummy foot are produced using additional manufacturing processes. These are then connected to the joint parts. The dummy foot and the test procedure are intended to create a uniform standard for evaluating the functionality of lower leg orthoses or ankle orthoses.

Commercial Opportunities

In Germany alone, annual health care expenditure based on the example of diabetic foot syndrome, is around €2.5 billion. This expenditure is due, among other things, to the high rate of diabetes-related amputations. The newly developed dummy foot, including the test and evaluation procedure, offers a technically and scientifically justified standard for proving, for example, that the foot is adequately immobilised by the orthosis. On the one hand, this ensures ideal patient care. On the other hand, there is

the potential of being able to make cost savings for health insurance companies, as amputations can be avoided.

Current Status

The functionality can be demonstrated using a prototype. The dummy foot and the procedure for testing the orthosis are patent pending. We are happy to inform you about the status of the procedure. On behalf of the University of Paderborn, PROvendis is offering interested companies the opportunity to license and continue to develop this technology.

Relevant Publications

Schafraan, T.; Schraeder, D. T.; Schramm, B.; Kullmer, G.: Postoperative Versorgung des Charcot-Fußes mittels Unterschenkelorthese – aktueller Stand der Versorgung und Perspektiven der additiven Fertigung. In: OT World.connect 2020: Internationale Leitmesse und virtueller Weltkongress für Prothetik, Orthetik, Orthopädieschuhtechnik, Kompressionstherapie und Technische Rehabilitation. Leipzig, 27. bis 29. Oktober 2020, ePoster.

An invention of the University of Paderborn.

Competitive Advantages

- Individual adaptation of the orthosis
- Ability to record stiffness or movability
- Standardized evaluation
- Improvement in patient care
- Reduction in the rate of amputations

Technology Readiness Level

1 2 3 4 5 6 7 8 9

Technology demonstrated in relevant environment

Industries

- Orthopaedic technical workshops and operations
- Medical technology

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