

Developing a Load Cycle Test Setup to Evaluate the Durability of Ankle-Foot Orthoses

Problem Definition

This graduation project is for an organisation specialised in personalised braces on the basis of 3D-scans. They are looking into developing personalized ankle-foot orthoses (AFOs), with the use of 3D-printing. However, it is unknown if 3D-printed AFOs can provide 2 years of care without breaking or significantly losing performance.

Solution

To address this question a load cycle test setup was designed to simulate 2 million steps with an AFO. The design consists of a dummy lower leg, on which the AFO is strapped, attached on the end of a linear actuator. This dummy leg lands on a rotating platform. The combined action recreates the realistic loading on the AFO due to the 3 rocking motions of a step.



1. Heel rocker (heel-strike)

2. Ankle rocker (mid-stance)

3. Forefoot rocker (toe-off)

The three rocking motions of a step recreated in the test setup.



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