

# 3D printed Ankle Foot Orthosis

a patient specific orthopaedic aid



'Drop foot syndrome' is a diagnosis given to patients with a specific muscular weakness or paralysis in the lower leg. They are unable to sufficiently lift their foot during walking resulting in not enough clearance from the ground. They will stumble over minor obstacles of only a few millimetres high. For these patients, an Ankle Foot Orthosis (AFO) provide a sufficient solution. This orthopaedic brace limits the ankle movements and prevents the foot from downward rotation, providing a safe walking gait. The current custom-made AFO is vacuum formed around a foam representation of the patient's leg, but the patient specific design makes it ideal for the one-off production freedom of 3D printing.

The current vacuum formed AFO provides suboptimal support and increases the energy cost of walking. This project investigated the possibility of 3D printing an AFO and improving the current design. The new 3D printed version is designed to provide the minimal needed support and therefor reduces the energy cost of walking with an AFO. The springs on the sides have no influence when the ankle is rotated forward while providing just enough force to ensure a safe walking gait. Next to that, the geometric freedom of 3D printing makes it possible to have variable wall thicknesses providing stiffness and flexibility where needed.



Ewoud Veltmeijer  
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**Committee**  
Company  
Dr. ir. Doubrovski, E. L.  
Jellema, A. H., MSc.  
Ten Cate, W. J. A., MSc.  
Centrum Orthopedie Rotterdam

**TU Delft**