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## NUMERICAL AND EXPERIMENTAL ANALYSIS OF THE 3D PRINTED MULTI-MATERIAL ANKLE-FOOT ORTHOSIS

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The application of 3D printing in medicine is the major area to concern in the nearest future. Namely, it is convenient to additively manufacture the Ankle-Foot Orthosis (AFO) by fused-deposition modeling 3D printer. AFO is the device, used in medicine, to help the patients rehabilitate from the foot drop disease. The shape of the AFO may vary depending on the leg and foot specifications of the patient. In this paper, three models of the AFO were designed to analyze both numerically and experimentally, those are fracture propagation, stress distribution, and deformation. The regions with the highest stress concentration were altered with the Nylon 12, and this contributed to stress reduction. Three different gait instances were considered for the numerical simulations FEA software. Then, the simplest model to prototype and its modified versions were tested by the compression machine, and the results were compared with the numerical ones. This work demonstrated the significance of the optimization of the multi-material 3D printed AFO's performance and comfort for patients.