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STUDY OF INDIVIDUALIZED LEG ORTHOSES MADE BY 3D PRINTING OF COMPOSITE MATERIAL

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Individualized orthopedic supplies are currently produced mostly by manual means – using negative and positive casts of patients' limbs and manual work of orthotic technicians. This is neither quick nor cheap, and thus availability of specialized orthotics for people with special needs is low. The progressive development of medical technology and medicine allows to increase the level of personalization of medical procedures and implement an individual approach to each case and patient. Modern, digital process, based on 3D scanning, CAD and 3D printing, brings more possibilities, but is also difficult to perform correctly and requires highly qualified engineers. A possible solution is design automation – with use of intelligent CAD models it is possible to greatly reduce time and level of skills needed from the designer of an individualized orthopedic device. The paper focuses on developing therapeutic leg orthosis for a 4-year old patient. The orthosis was built using the automated workflow of AutoMedPrint system, developed at Poznan University of Technology. Both legs were 3D scanned and the obtained data was merged to obtain a target corrected geometry of the legs. Then, the orthoses were automatically designed and adjusted to the special needs of the patient. It was then 3D printed using FDM process with ABS materials and composite ABS with carbonfibre and tested with the patient with positive results, enabling to improve the therapeutic process and compare the differences between the two materials.