

ADVANCED DESIGN METHODOLOGIES IN THE DEVELOPMENT OF HAND-SPLINTS

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Summary: Hand splints come in a varied assortment of configurations and sizes to accomplish many different functions for support and immobilization. Athletic trainers, occupational therapists, physical therapists, orthopaedic doctors and emergency room and ambulance professional personnel often require specific hand splints to help their patients recover or rehab from injuries, or to assist in deformities or spasticity caused by certain health conditions. In many occasions, the patients are forced to use the hand splints during some time and due to their aesthetics, the patients aren't always comfortable in using them in every occasion.

The main objective of this paper is to present novel design methodologies composed of advanced digital and physical manufacturing systems in order to produce good aesthetic light-weight hand splints. The steps are composed of 3D scanning the patients arm and then producing a digital model which is then optimised by using topological optimisation algorithms. After obtaining the optimised model, the physical model is then produced in an additive manufacturing system. The final result is an optimised light-weight hand splints with a design that the patient will feel comfortable in using in any occasion, even ceremonies, without compromising its objective functionality, helping them recover or rehab from injuries, or to assist in their deformities or spasticity.