

عنوان مقاله:

Designing and Manufacturing of a 3D-printed, Open-source Acrylonitrile Butadiene Styrene Dynamic Splint for Rehabilitation of Fingers Flexor Tendon Injury

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خلاصه مقاله:

The hand must be capable of operating properly to act in all its complex abilities. Assistive technology, such as a dynamic splint, could be used to improve hand function for individuals with spinal cord injury. Split is an external device used for immobilization of the affected joint. Manufacturing of these orthotists are time-consuming and can be heavy and uncomfortable for patients. 3D printing is a revolutionary production process that directly creates physical parts from computer-aided design (CAD) models. Acrylonitrile butadiene styrene (ABS) is a polymer that is commonly used as filament in the Fused Deposition Modeling (FDM) system. Advancements on ABS properties are already varied and incomplete, and additional studies must be carried out to determine their properties before being used as a dynamic splint material. Compared to conventional orthosis, 3D-printed one has superiority such as lower cost and weight, simpler adjustment, and faster manufacturing. To improve the traditional splinting approach, this study focused on assessing additive manufacturing techniques for hand splinting. In this study, a detailed mechanical property assessment was carried out for ۱۲ ABS specimens to determine the effect of the density of the infill and the thickness of the layer on the mechanical properties of the manufactured dynamic splint. By analysis, the results of the tensile test, the part printed with ۱۰۰% infill density and ۰.۱ mm layer thickness achieved optimum ABS filament parameters. In the end, the designed dynamic splint was manufactured by using an FDM method

کلمات کلیدی:

3D-printing, Splint, Rehabilitation, Acrylonitrile butadiene styrene (ABS), Mechanical properties

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