ABSTRACT

Fractures are continuity damages of bone structure, cartilage and growth plates caused by trauma and non trauma, fractures in the lower extremities have the highest prevalence among other fractures, about 46.2% and getting treatment by using casts immobilization with short leg cast type. Cast immobilization in a short leg cast type basically uses casts and synthetic materials to form the inner surface of the foot that can adjust to the shape of the user's feet and on the outside using plaster, but 72.5% of patients that used conventional cast immobilization gets irritation to the skin, itching and rash due to the use of wet material in the cast. Therefore the short leg cast design needed is that the one that does not have an irritating effect and does not reduce the general function of the cast. User needs collected based on these problems is to determine the dimensions of the foot pattern by utilizing the Additive manufacturing and trial and error. With purpose to producing a dimension of short leg cast that can be used by all samples, there are three parameters used as primary parameters, which are calf circumference, ankle circumference A, and foot circumference A, which has a tolerance to the calf and ankle area by 5 mm and on the sole of the foot by 2 mm. in this study the results obtained from this were 64 designs with short leg cast dimensions that could be used for each sample by performing a combination of each primary parameter in each category, furthermore get 93.7% results in the user acceptance test and 92% in the user experience test.

Keywords : Cast immobilization, Orthopedic cast, Additive Manufacturing, Short leg cast, 3D Printer, 3D Scanner