

A Comparative Study on the Dimensional Error of 3D CAD Model and SLS RP Model for Reconstruction of Cranial Defect

Authors : L. Siva Rama Krishna, Sriram Venkatesh, M. Sastish Kumar, M. Uma Maheswara Chary

Abstract : Rapid Prototyping (RP) is a technology that produces models and prototype parts from 3D CAD model data, CT/MRI scan data, and model data created from 3D object digitizing systems. There are several RP process like Stereolithography (SLA), Solid Ground Curing (SGC), Selective Laser Sintering (SLS), Fused Deposition Modelling (FDM), 3D Printing (3DP) among them SLS and FDM RP processes are used to fabricate pattern of custom cranial implant. RP technology is useful in engineering and biomedical application. This is helpful in engineering for product design, tooling and manufacture etc. RP biomedical applications are design and development of medical devices, instruments, prosthetics and implantation; it is also helpful in planning complex surgical operation. The traditional approach limits the full appreciation of various bony structure movements and therefore the custom implants produced are difficult to measure the anatomy of parts and analyse the changes in facial appearances accurately. Cranioplasty surgery is a surgical correction of a defect in cranial bone by implanting a metal or plastic replacement to restore the missing part. This paper aims to do a comparative study on the dimensional error of CAD and SLS RP Models for reconstruction of cranial defect by comparing the virtual CAD with the physical RP model of a cranial defect.

Keywords : rapid prototyping, selective laser sintering, cranial defect, dimensional error

Conference Title : ICMPE 2014 : International Conference on Mechanical and Production Engineering

Conference Location : Miami, United States

Conference Dates : March 10-11, 2014