

AMILLIA KARTIKA SARI, 091525053005, Production of 3-dimensional Prototype Mandibular organ with *CT-Scan* Image Segmentation Method. Thesis supervised by Dr. Riries Rulaningtyas, ST.,MT and Dr.Khusnul Ain,S.Si., M.Si., Master of Biomedical Engineering Program School of Postgraduate, Airlangga University

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## ABSTRACT

Tumor abnormalities in the mandible can result in bone defects. The defect causes changes in anatomy and bone functionality so that it negatively affects the social life of the patient. One solution to the above case is the mandibular reconstruction surgery.

Several things were done to optimize mandibular reconstruction surgery was by using 3D mandibular prototypes. 3D prototypes are the result of the printing technology of 3-dimensional objects from combining several materials such as plastics, polymers, ceramics, liquids, living cells.

The process of making a 3D mandibular prototype carried out at an early stage is the acquisition of mandibular CT-scan images, and stored in \*DCM (DICOM) format. The second stage is image processing, namely the segmentation process, the 3D visualization process with the last format is \*STL, and the last stage is the printing process.

From the analysis and evaluation of 230 images of the mandible with \*DCM (DICOM) format in the segmentation process using the active contour method, the average accuracy values were 99.8%. Also analyzed and evaluated on the results of prototype printing, measurements were taken on the length dimension of the ramus area, angulus and body of mandible. The long dimension values in these 3 areas gave 99.317% measurement accuracy between the cadaver mandible and the 3D prototype. It can be concluded that the active contour method provides accurate results in the segmentation process for the production of 3-dimensional prototypes.

**Keywords:** 3D prototype, Image Segmentation, Mandibular, and CT-Scan.