INTISARI

Tissue engineering adalah pengembangan teknologi biomedis yang bertujuan menciptakan pengganti biologis untuk memperbaiki atau mengganti organ dan jaringan yang rusak, dengan menggunakan *scaffolds* yang ditanam dalam organ dan jaringan yang rusak. *Scaffold* untuk menumbuhkan sel-sel dalam bentuk struktur teknik tinggi dengan bertindak sebagai dukungan sementara untuk sel melakukan regenerasi jaringan.

Penelitian ini dirancang guna mengembangkan sebuah mesin purwa rupa berdasarkan mesin *Aqueous Based Extrusion Fabrication* (ABEF) yang dapat membuat *scaffolds hydroxyapatite* (HA), proses perancangan menggunakan metode fungsional, pengendali sistem mesin purwa rupa ABEF yang dipakai berupa pengendali berbasis LCD *controller RepRap Arduino Mega Pololu Shield* 1,4, menggunakan perangkat lunak *RepRap 3D printer* dengan adanya mesin purwa rupa ini diharapkan dapat mempermudah penanganan kasus restorasi tulang karena dapat menyesuaikan bentuk dan ukuran *macroporous* HA sesuai kebutuhan.

Berdasarkan hasil penelitian, mesin purwa rupa ABEF mampu membuat *scaffolds* dengan struktur beraturan dengan nilai akurasi dimensi diameter mencapai -0,01 mm dan akurasi dimensi rongga sebesar -0,21 mm.

Kata kunci: *tissue engineering, scaffold, aqueous based extrusion fabrication, hydroxyapatite, RepRap 3D printer.*

ABSTRACT

Tissue engineering is the development of biomedical technology that aims to create a biological substitute for repairing or replacing damaged organs and tissue, using scaffolds were implanted in the damaged organs and tissues. Scaffold to grow the cells in the form of a high technical structure by acting as a temporary support for the cells to regenerate tissue.

This research was designed to develop a prototype for the machine by machine Aqueous Based Extrusion Fabrication (ABEF) that can make scaffolds hydroxyapatite (HA), process design using functional method, system controller prototype for ABEF engine used in the form of LCD controller-based controllers RepRap Arduino Mega Pololu Shield 1.4, using software RepRap 3D printer in the presence of such a machine prototype is expected to facilitate the handling of the case of the restoration of bones as it can adjust the shape and size of macro porous HA as needed.

Based on the research results, the machine prototype for ABEF able to make scaffolds with irregular structure with dimensional accuracy value of diameter -0,01 mm and dimensional accuracy of spacing -0,21 mm.

Keywords: tissue engineering, scaffold, aqueous based extrusion fabrication, hydroxyapatite, RepRap 3D printer.