

INTISARI

Sendi panggul buatan merupakan sendi yang diciptakan manusia untuk menggantikan sendi panggul yang sudah mengalami kerusakan. Sendi panggul buatan dikembangkan dengan berbagai bentuk, dimensi, dan paduan material. Sendi panggul buatan umumnya menggunakan material *cobalt chrome (CoCr)* dan *Ultra High Molecular Weight Poly Ethylene (UHMWPE)*. Kedua permukaan sendi buatan yang saling bergesekan akan mengalami keausan. Keausan sendi buatan perlu diuji sebelum digunakan. Tujuan penelitian ini adalah menghasilkan rancangan dan prototipe alat uji keausan sendi panggul buatan.

Langkah-langkah yang dilakukan dalam perancangan dan pembuatan prototipe alat uji keausan sendi panggul berupa studi literatur anatomi sendi panggul, perancangan dengan *software*, persiapan alat dan bahan, *machining*, perakitan, pengecatan pemolesan, dan perakitan tahap akhir. Perancangan alat uji keausan sendi panggul mengacu pada standar ISO 14242-1 dengan tiga mekanisme gerak dan satu mekanisme pembebanan. Mekanisme-mekanisme digerakkan menggunakan *disc cam*. Material yang digunakan untuk membuat setiap komponen adalah *low carbon steel* dan *stainless steel*. Prototipe alat uji keausan menggunakan komponen standar lainnya seperti *bearing*, *timing belt*, *pulley*, inverter dan motor listrik.

Hasil penelitian mendapatkan rancangan dan prototipe alat uji keausan sendi panggul buatan telah diwujudkan. Prototipe alat uji keausan sendi panggul dapat mensimulasikan gerakan adduksi-abduksi, fleksi-ekstensi, rotasi internal-eksternal dan variasi pembebanan sesuai standar ISO 14242-1. Prototipe alat uji keausan sendi panggul buatan yang mampu mensimulasikan aktualnya gerakan dan beban sendi ketika seseorang sedang berjalan.

Kata kunci: sendi panggul buatan, uji keausan, perancangan, prototipe.

ABSTRACT

An artificial hip joint is created to replace the hip joint that has been failure. Artificial hip joint is developed with a variety of shapes, dimensions, and alloy materials. Cobalt Chrome (CoCr) and Ultra High Molecular Weight polyethylene (UHMWPE) is generally used material of an artificial hip joint. Both of artificial joint surfaces rubbing together will suffer the wear. The wear of artificial joints needs to be tested before use. The purpose of this research is to design and prototype testing machine of artificial hip joint wear.

Steps in the design and manufacture of hip joint wear test simulator prototype are literature study of the hip joint anatomy, design with CAD software, preparation of tools and materials, machining, assembly, painting, polishing, and final stage assembly. The design of the hip joint wear test simulator refers to ISO 14242-1 with the three motion mechanism and a loading mechanism. Driven mechanisms is using disc cam. Low carbon steel and stainless steel material are used to create each component. Hip joint wear test simulator prototype uses standard components such as bearings, timing belt, pulley, inverters and electric motors.

The results of this research is a design and prototype hip joint wear test simulator has been realized. Prototype of testing machine can simulate the wear of the hip joint movement abduction adduction, flexion extension, internal rotation, and external load variation in accordance with ISO 14242-1. Prototype testing tool of the artificial hip joints wear are capable of doing the actual motion and loads on a hip joint when someone is walking.

Keywords: Artificial hip joint, wear test, design, prototype.