

## **Design and development of low-cost exoskeleton hand robot structure**

### **ABSTRACT**

Number of people with traumatic injury related to hand amputation is rising up day by day and it causes them to experience a lot of problems, especially in performing their daily life activities. There are many prosthetic hands that have been developed to assist people to do the activities like a normal person. The feature of the hand robot structure is the main issues to be studied in order to construct a user-friendly and high performance device. There are various considerations must be taken in order to identify the best type of material of the hand robot structure such as material durability, size, weight and fabrication cost. The objective is to present the static analysis of exoskeleton robotic hand structure for the evaluation on the selected material used such as aluminum and acrylonitrile butadiene styrene (ABS). From this, the effect of the material to the strength of the structure is observed. The 3D drawing and the static analysis of the hand robot structural design are performed by using Autodesk Inventor Professional software. The static analysis is focused on the safety factor evaluation of the structure by referring the ratio between the strength of the finger structure and the force (load) with a direction exerted on the tip of it. Hence, the maximum load withstood by the structure with the respective material can be determined. The results have shown that the maximum force that can be withstood by aluminum hand robot structure is much higher than ABS hand robot structure. The findings have shown that aluminum finger structure is able to withstand less than 3KG of load for no damage on the structure. Thus, the strength of robot structure is effected by the type of the material used and aluminum is more durable than ABS.

**Keyword:** Hand; Exoskeleton