



DEVELOPMENT OF AN SMA TESTING RIG FOR FINGER PROSTHESIS

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A thesis submitted in partial fulfillment of the requirement for the award of
Bachelor of Mechanical Engineering (Hons)(Manufacturing)

**Faculty of Mechanical Engineering
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MAY 2010

“I declared that this thesis is the result of my own work except the ideas and summaries which is I have clarified their sources. The thesis has not been accepted for any degree and is not concurrently in candidature of any degree.”

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ACKNOWLEDGEMENT

In the name of Allah, the Most Benevolent and Most Merciful, praise to Allah S.W.T. Thanks to Allah for giving me His blessing to complete this Final Year Project, MEM 602 (A Study on SMA Actuation System for Laboratory Finger Prosthesis) on time. I would like to express my deepest gratitude to my supervisor, Dr. Ing. Low Cheng Yee, for his invaluable guidance, consistent advices, sharing his valuable time, encouragement and patience upon the completion of this final project.

Special thanks to all technicians and staffs at Mechanical Engineering workshop of Sheet Metal & Machine, Mr. Johari, and Mr. Helmi for giving me a permission to use the machinery at the workshop. Not forgotten to Mr. Ayub for giving me a permission to use the Load Cell and for technician Mr. Arif and Mr. Norazman from material science lab for giving permission to run the experiment there. Not forgotten to technician Mechatronic lab Mr. Wan to giving me to use the equipment lab and sharing their knowledge on this project. Also special thank to Mr. Tan the supplier of the Load Cell, on their technical support, sharing their knowledge and teach me about manual of data logger and load cell.

Also special thanks to Mr. Hafizan Hashim giving his guidance in order to start set-up the experiment, their useful opinions, and skills especially in getting the results of the experiment. Not forgotten to my beloved family, fellow friends, housemates, and each individual who has contributed either directly or indirectly throughout the progression of this final year project.

ABSTRACT

This paper is focuses on the experimental verification of a SMA actuation system. The aim of this project is utilizing Shape Memory Alloy (SMA) as actuators in controlling the flexion-extension of finger prosthesis and the preparing the experiment set-up for testing the SMA wire. The shape memory alloy used in this study is a straight wire which is made of Nickel Titanium Alloy called Nitinol [10]. The SMA has advantages such as powerful, lightweight, simple joining and compact [2]. In this project SMA wire will act as tendons. When current is applied, the SMA wire will be heated and transformation will happen from the Austenitic phase to Martensite phase [6]. In that phase the microstructure of SMA are also changed. The advantaged is producing significant forces and displacement capabilities while consuming only low power and low energy [3]. An actuator unit that consists of SMA wire and spring is set-up, and transfer function of the actuator unit related to applied voltages and generated forces are measured [12]. The aim is to find out the relationship between forces and voltage. From that graph, important characteristics and behavior of SMA can be studied and then applied for the finger prosthesis [12].

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