

EFFECTS OF PROSTHESIS STEM LENGTH ON STRESS DISTRIBUTION IN CEMENTLESS HIP ARTHROPLASTY

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

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MAY 2009

ACKNWOLEDGEMENT

By the name of ALLAH s.w.t, with His almighty, the most gracious and merciful. I praise Him and seek His noble Prophet Rasullullah s.a.w. Million of grateful to Allah s.w.t because enable me to complete this research. I would like to express sincere gratitude and appreciation to my supervisor, Mr Abdul Halim Abdullah for his generous guidance, concern, help, patient, and encouragement and continue support in duration of the thesis preparation until its completion.

Special thanks to him for the advised, guidance and assistance from beginning till the end of the research work. My gratitude is also extended to my father, Jaafar Bin Haji Ismail, my mother, Kamariah Bte Haji Kadri, my family who have been the pushing factor behind my work and it was only by their desire that I have come this far. Finally, thanks to my team members; Firdaus and Samraa and all those who give their contribution and helped me directly and indirectly in making this project success.

"May Allah bless all of you"

ABSTRACT

Total Hip Replacement (THR) represents a modern surgical technique that allow for replacement of the natural hip joint by an artificial one. In this study, finite element analysis (FEA) of the THR is performed. The effects of prosthesis stem lengths on the resulting stress are obtained. Three different lengths of prosthesis stem namely short, medium and long are analyzed. The result of each stem are discussed and compared. The prosthesis stem design is based on established model of Charnley prosthesis while the femur model is gathered from net. Both design were modeled and modified using CATIA software while MSC PATRAN, NASTRAN software is used for analysis. The stem is defined as bio compatibility material that is Ti-6AI-4V while the femur is based on cortical bone properties. The loads apply to the THR model are based on physiological load of level walking conditions of human with average weight of 80Kg. Two major loads are considered in the model that are joint contact force and abductor muscle force and fixed at the bottom end. The results are discussed with respect to Von Misses stress of the analysis. Cementless THR with medium stem represent the best stress distribution as compare to intact femur. It is suggested to have experimental result for appropriate findings.

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