

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

CONTROLLING TOTAL ENERGY AND POTENTIAL  
SAVING COST OF WATER USE IN SHOWER HEAD  
USING MATHEMATICAL EQUATION

NIRWANA BINTI MAT DAWOD  
201330318 D1CS2496A

Report submitted in partial fulfillment of the requirement  
for the degree of  
Bachelor of Science (Hons.) Mathematics  
Center of Mathematics Studies  
Faculty of Computer and Mathematical Sciences

JANUARY 2017

## ACKNOWLEDGEMENTS

**Bismillahirrahmanirrahim,**

Alhamdulillah Thanks to Allah SWT, whom with His bless gave me the opportunity to complete this Final Year project (FYP) report was prepared for the Faculty of of Computer and Mathematical Sciences, University Teknologi Mara Machang, Kelantan (UITM). This report is partial fulfillment of requirement for the completion of Bachelor of Science Mathematics with honor.

Firstly, I would like to express my deepest thanks to Madam Rahaidah binti Muhamad, my assigned supervisor who had guided me in completing my FYP report. I also want to thanks the lectures of UITM especially to Madam Wan Khairiyah binti Wan Hulaini for her cooperation during my FYP which have guided me with valuable information, suggestions and guidance for the compilation and preparation this FYP report. Deepest thanks and appreciation to my parents, family and others for their cooperation, encouragement, constructive suggestion and full support for the report completion, from the beginning till the end. Also thanks to all of my friend and everyone those have been contributing by supporting my work and guide myself during the final year project progress till it is fully completed.

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## ABSTRACT

The purposes of this study was to controlling the amount of water flow by compare the relationship between flow rate, velocity, hole diameter, number of holes, pipe diameter, value of Reynolds number, friction factor, energy used and cost of savings. The energy consumption at the shower head were calculated using continuity equation and Bernoulli equation. Meanwhile calculation cost of water use per 2 month was done by using the mathematical equation provided by David Public Works Department. This paper analyzed eight types of shower head. In this project, analyzed the different type of shower head indicated that shower head of Type 5 is the best model to reduce energy consumption during shower in which has the low value of resistance factor,  $f$ . Meanwhile shower head type 1 and 2 is the best two model to reduce the cost of water by just using for about 3.8 cost of water use compare than other types of shower head. Further analysis for this shower heads have been conducted and shows that shower head Type 1,2 and Type 5 is the best models to make the correction in order to reduce the energy and cost of water used. I have speculated that these difference are affected respectively by hole diameter, pipe diameter, velocity of water and flow rate.

# 1 INTRODUCTION

## 1.1 Research Background

Malaysia using average 203 to 280 liters of water a day depending on the type of activity and the duration of use of where each Malaysians people were found wasted 50,000 liters of water a day. Water is a limited resources around the world. Yet, people have numerous opportunities on the best way to use it properly and save it. One of the opportunities is by water preservation by reduce the amount of water during shower at home.

Showers are the responsible for about 38 percent of home water use and are a major component in bathroom water conservation. Water utilization by showers and the suitable methodologies to impact water utilized was fluctuate depend on those kind of shower. South Staff Water (2016). Today, with hundreds of models of shower head available, people has many choices. However, one choice that is not available is complete control of the water flow.

Low-flow shower heads have been introduced and suitable for those who live in area that lack of water resources. By using low-flow shower heads, they can enjoy the benefits from the bathroom and also save water for other purposes. Shower head come in various sizes and can be installed in accordance with the state of the bathroom. Besides that, customers need showers which give great water stream and good temperature in place to shower and additionally revel in those experience for showering. The bargains for every one shower would expanding quickly as that is only the certain of the iceberg families decide to introduce showers.

Now, those bargains about every one shower are expanding quickly due to the increases level of concern of families toward appropriate use of shower heads. Shower additionally bring turned into a standout among those essential components on bathrooms. Furthermore individuals cannot envision their bathrooms without an shower because it gives them an opportunity to take the shower without any nuisance and they enjoy while they taking a shower. It is also very important to know some facts about the equipment that used especially when it comes to the