



**DESIGN AND DEVELOPMENT OF PORTABLE
ABLUTION PRODUCT FOR MOTORCYCLIST**



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**BACHELOR OF MECHANICAL ENGINEERING
TECHNOLOGY (MAINTENANCE TECHNOLOGY)
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**Faculty of Mechanical and Manufacturing Engineering
Technology**



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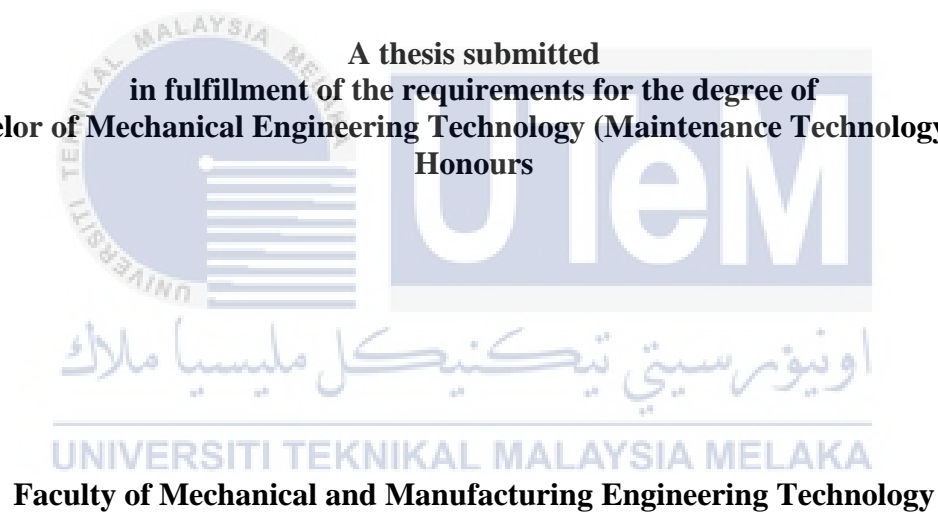
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**DESIGN AND DEVELOPMENT OF PORTABLE ABLUTION PRODUCT FOR
MOTORCYCLIST**

ABDUL HAQIM BIN ABDUL AZIZ

**A thesis submitted
in fulfillment of the requirements for the degree of
Bachelor of Mechanical Engineering Technology (Maintenance Technology) with
Honours**



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2022

DECLARATION

I declare that this Choose an item. entitled “ Design and Development of Portable Ablution Product for Motorcycles ” is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature

: *Abdul Haqim Bin Abdul Aziz*

Name

: **ABDUL HAQIM BIN ABDUL AZIZ**

Date

: 14 . 1 . 2022



APPROVAL

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the Bachelor of Mechanical Engineering Technology (Maintenance Technology) with Honours.

Signature : 

Supervisor Name : *TS. SHIKH ISMAIL FAIRUS BIN SHIKH ZAKARIA*

Date : *25.1.2022*



DEDICATION

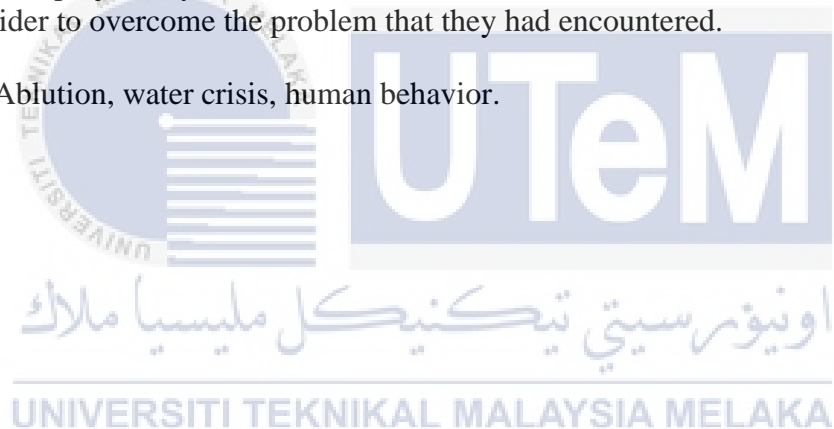
For this project, i sincerely dedicated to my beloved mother, Napisah Binti K.Ibrahim, my super visor, Ts. Shikh Ismail Fairus Bin Shikh Zakaria, and my colleagues, which is Muhammad Safwan Arif Bin Mohd Sanusi, Abdul Hasif Aniq Bin Abdul Hadi and Amirul Aiman Bin Fadzil for always giving support and encouragement to complete this project. I hereby giving all my respect to all of them because without them, I wouldnt achieve until now.



ABSTRACT

Nowadays, dealing with a water shortage is a typical occurrence. Not only had the water been poisoned as a result of human conduct, but it had also always been wasted on purpose without any care from the people who used the water. This behaviour not only has an impact on a small number of people, but it also has an unexpected impact on a large number of people who are unable to consume clean and fresh water. On the other side, many Muslims, particularly those at Rest and Service (RnR), are experiencing a water shortage if they wish to practise wudhu. The primary goal of this initiative is to resolve the problem that motorcyclists have experienced when they arrive at RnR only to discover that there is no water available for ablution. In addition to resolving the issue that had been raised by motorcyclists, the goal of this project is to build a portable device that will allow any biker to perform ablution with ease. Several proposed prototypes were designed during the research period. Autodesk Fusion and SimSolid software had been used in order to accomplish this project. By the end of the results, it is intended that this worksheet will have helped the rider to overcome the problem that they had encountered.

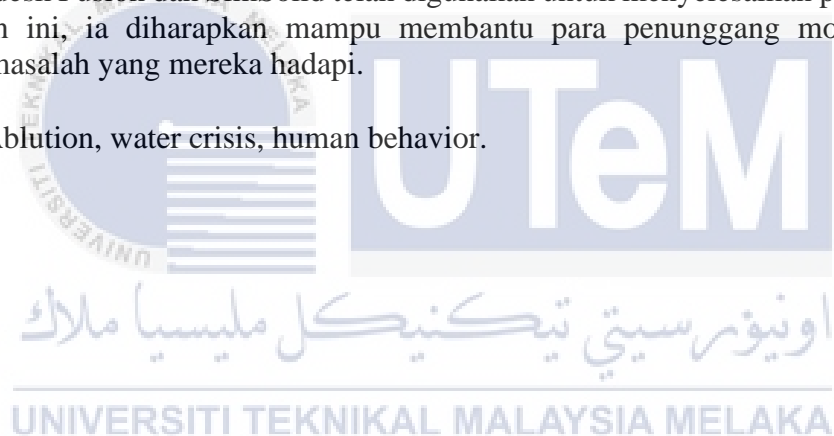
Keywords: Ablution, water crisis, human behavior.



ABSTRAK

Pada masa kini, menangani isu air adalah satu isu yang sering didengari oleh banyak pihak. Bukan sahaja air telah dicemar oleh kerana perbuatan manusia itu sendiri, malah air juga selalu dibazirkan tanpa rasa bersifit tanggungjawab terhadap alam sekitar. Tingkah laku ini bukan sahaja memberi kesan kepada sebilangan golongan kecil, malah ia memberi kesan yang tidak dijangka besarnya atas sebab sifat dan tingkah laku yang dibuat oleh manusia itu sendiri. Di samping itu, sebahagian orang muslim mempunyai masalah dalam mencari air yang bersih terutamanya apabila sudah tiba ti kawasan hentian rehat (RnR) untuk mengambil wudhu. Dalam konteks ini, kajian dijalankan untuk menyelesaikan masalah yang dialami oleh orang muslim terutamanya kepada penunggang motosikal. Selain daripada itu, kajian ini juga adalah untuk membina satu kemudahan kepada penunggang motosikal sekiranya ingin mengambil wudhu ketika berada di kawasan hentian rehat. Dalam pada masa yang sama, Autodesk Fusion dan SimSolid telah digunakan untuk menyelesaikan projek ini. Pada akhir kajian ini, ia diharapkan mampu membantu para penunggang motosikal dalam mengatasi masalah yang mereka hadapi.

Keyword: Ablution, water crisis, human behavior.



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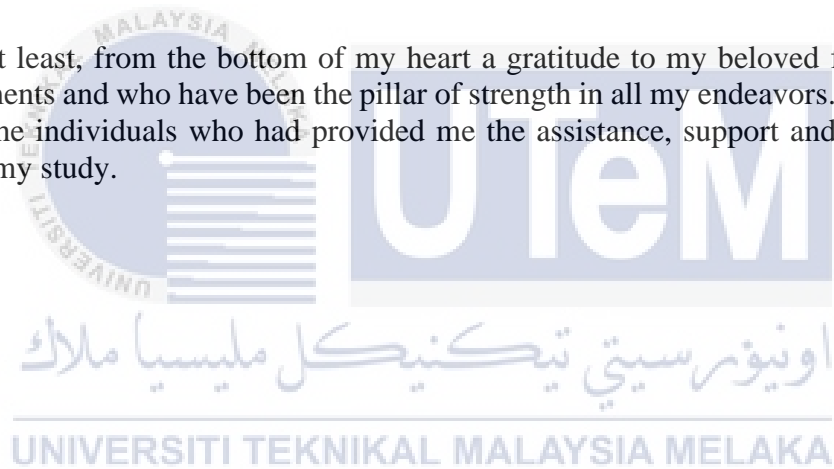


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LIST OF SYMBOLS AND ABBREVIATIONS

FEA	-	Finite element analysis
CAD	-	Computer aided design
DOF	-	Degree of freedom



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CHAPTER 1

INTRODUCTION

1.1 Background

Ablution or "wudhu," according to the Quran, is a ritual washing that is obligatory for Muslims to ensure cleanliness before the Muslims pray. As stated by Al Bukhari, Prophet Muhammad Peace Be upon Him said "cleanliness is half of faith". Every Muslim is required to wear clean clothes and to be clean before praying. In general, ablution is followed by washing on specific body parts, and there are rules and procedures to follow when performing the ablution.

Ablution consumes an enormous amount of water to ensure that part of our body is clean and ready to lift our feet and fulfill the need of a prayerful Muslim. This project relates to the activity of Muslims in ordinary routine, particularly in performing prayer based on what had been stated above. Ablution, in particular, is a ritual of washing parts of our bodies, which includes washing our hands, cleaning our mouths of food waste, washing our faces, noses, arms, and swabbing a small amount of water on our heads, ears, and feet. Ablution is essentially a synonym for the word water; having a limited supply of water can make performing ritual activities in daily life more difficult for Muslims. Water is essential in ritual ablution. According to some research, the amount of water required for a Muslim to perform a ritual ablution is only half to two liters. A standard ablution procedure required six to nine liters of water (Zaied, 2017). Some Muslims use water sparingly, while others waste water.

Furthermore, to achieve a better experience and make ablution comfortable for all Muslims, whether at the mosque or the *musolla*, it is necessary to have a proper place in performing ablution. According to a quote from our Prophet, from Qathm bin Tamman or Tamman bin Qathm, Rasullah s.a.w said that

“Whoever doesn’t bother my people, of course only ordered them to take ablution for every prayer and menstruation in every ablution” (Ahmad).

It also stated that having a proper place for doing ablution is the most important thing to be considered in building a mosque or musolla (Nashirudin & Jasmi, 2008). Construction of a spot for performing wudhu also needs an expert and an enormous of experienced architects.

The fundamental understanding of geographic construction is necessary in order to understand the will. Architects and designers are the primary foundation

“In addition, designers and architects must be aware of the minimum dimensions of human needs and furniture, whether at home or at work, including how well they place the furniture. Without this experience and understanding, they are less able to create an atmosphere in which space is not frittered away and people can feel at home while at work or even enjoy free time”

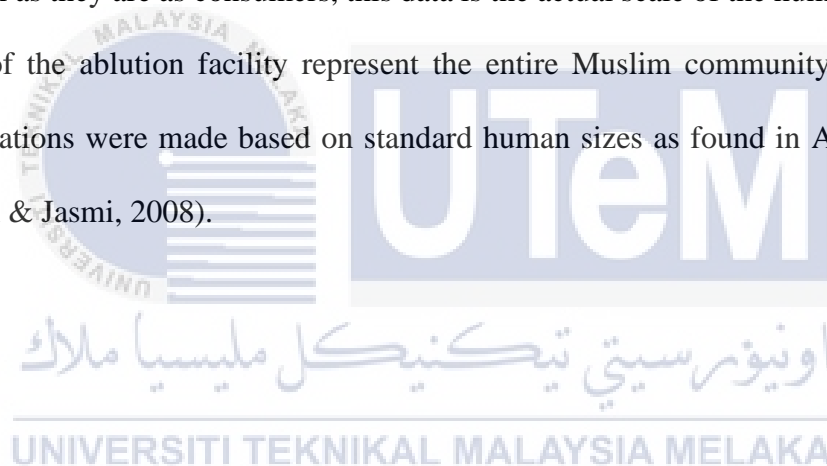
(International & Edition, 2014)

The research also demonstrated that the major element in building a *wudhu* room is the construction of the room by referring to the scale of the normal human body.

“Architects and designers must demonstrate how this accepted way can be created and how. They must comprehend the relationship between human body size and the space required by humans in a variety of postures and while moving around. They must be familiar with the sizes of everyday objects such as kitchen utensils, clothing, and so on in order to determine the size of furniture and storage of goods.”

(International & Edition, 2014)

In the design, anthropometric data will be used to determine the actual size. As fundamental as they are as consumers, this data is the actual scale of the human body. Since this users of the ablution facility represent the entire Muslim community of the world, recommendations were made based on standard human sizes as found in Architects' Data (Nashirudin & Jasmi, 2008).



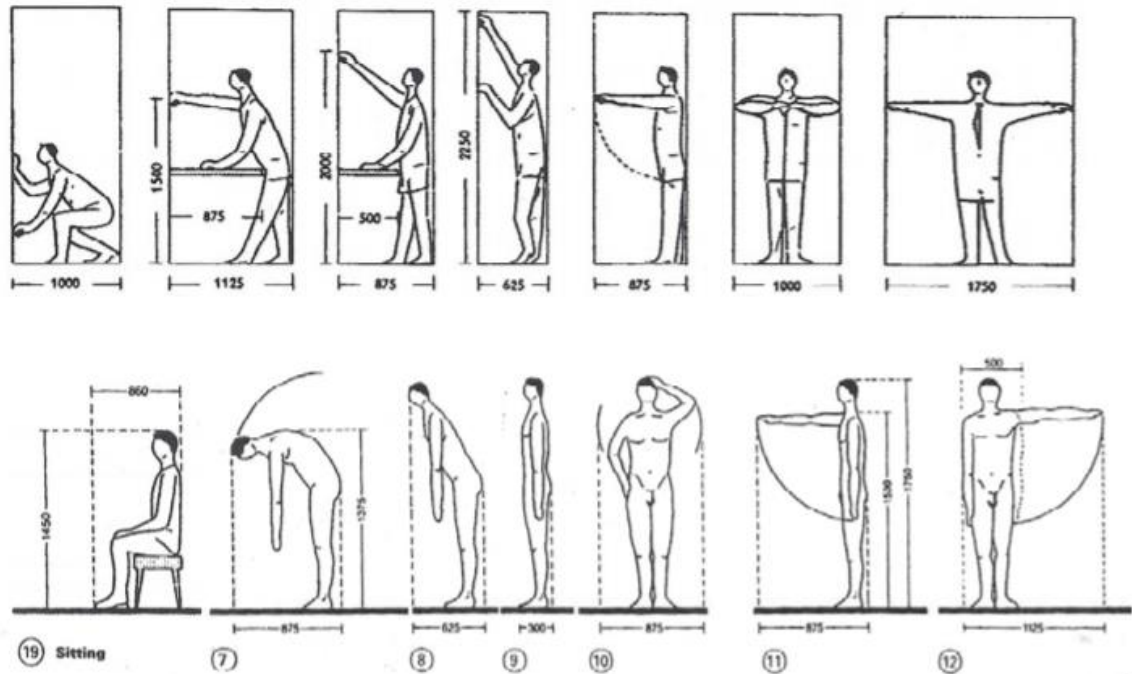


Figure 1-1: a posture of human body (Nashirudin & Jasmi, 2008)

The above diagram shows some of the different motions of the human body's posture to attain the proper motion when designing the ablution site later. This motion also gives the human being a proportion to the space around him, which is important for maintaining a proper distance between humans and humans and between humans and equipment. It also can prevent interference between others people when performing wudhu later. Apart from having a specific location for performing wudhu as a primary factor, splitting into different genders should also be considered as a primary factor to create an excellent room for performing wudhu. Our Prophet also said that,

قَالَ أَحْفَظْ عَوْرَتَكَ إِلَّا مِنْ زَوْجَتِكَ أَوْ مَا مَلَكَتْ يَمِينُكَ

Meaning: "Take care of your aurat except from the wife or slave you have.

(Al-Tarmidzi, Abu Daud, Ibnu Majah and Ahmad)

Because non-muhrim should not be able to see a person's *aurat*, the division of ablution space for men and women should be considered. View barriers, such as walls, can

be used to prevent visuals between men and women. The division of locations, as well as their placement relatively far apart from one another, is also important, as is smooth planning prior to determining the ablution place space. When it comes to worship, cleanliness is one of the most important aspects of daily life. As a result, it is recommended that the ablution area be separated from the toilet so that no pollutants are brought into the ablution area from the toilet.

Aside from explaining ablution, Malaysia has a common problem that people must deal with on a regular basis, which is a lack of clean water. Rivers are the primary source of water supply in Malaysia, accounting for approximately 97 percent of total usage, with groundwater accounting for the remainder. Water shortages may be related to climate change, which includes extreme weather events and water availability around the world, such as droughts or floods, increased pollution, and increased human demand and overuse of water (Rahman, 2018)

The consensus is that the effect will be to amplify extremes, with more severe droughts and flooding. The issue of water scarcity in Malaysia is a source of concern for the entire country. So at moment, 25 river basins have been detected as witnessing water stress. Among the items on the lists are Sungai Selangor, Sungai Bernam, Sungai Klang, Sungai Langat, Sungai.Tengi, Sungai Bernam, Sungai Kelantan, Sungai Perlis, Sungai Kedah, Sungai Merbok, Sungai Muda, Sungai Melaka, Sungai Muar, Sungai Johor, Sungai Kesang and Sungai Pontian Kecil. These event will cause extremely hard for all people especially Muslim when they want to perform their ablution (Rahman, 2018).



Figure 1-2: An abluton product that use spray mechanism

Based on nowadays product for portable abluton product, many were found that the design not just small but also limited for users to perform their abluton. This product is ideal for travellers who need to perform their abluton wherever they are. The product's design is also suitable for "bag packers," as it can save a lot of space in their bag and is also simple to use, requiring only one tap of spray and wiping it on the part that needs to be cleaned.

To be exact, the product not just good at designing a simple design and easy use for any users, it also consumes a small amount of water which can cause a lack of water needed for the users. Based on the problem statement stated, an effective product had been developed to ensure that the amount of water available for ablution is sufficient for ablution at any specific place.

1.2 Problem Statement

The current practice of ablution has led to significant wastage of clean water. There is a narration in the issue of ablution that states the prohibition of israf (excessive) water use.

This is compatible with a hadith from Abdullah Ibn Amru bin Al Ash R.Anhuma, who stated:

أَنَّ رَسُولَ اللَّهِ - صَلَّى اللَّهُ عَلَيْهِ وَسَلَّمَ - مَرَّ بِسَعْدٍ وَهُوَ يَتَوَضَّأُ فَقَالَ " مَا هَذَا السَّرَفُ " . فَقَالَ أَفِي الْوُضُوءِ إِسْرَافٌ قَالَ " نَعَمْ وَإِنْ كُنْتُ عَلَى نَهْرٍ جَارٍ

"The Messenger of Allah passed by Sa'd when he was performing ablution, and he said:

'What is this extravagance?' He said: 'Can there be any extravagance in ablution?' He said:

'Yes, even if you are on the bank of a flowing river.'"

Sunan Ibn Majah (425)

In this Hadis clearly said that making an excessive while doing ablution is absolutely not recommended because it can cause a shortage of water.

Besides doing a lot of wastage of clean water during ablution, there is also a lack of water resources during the water crisis. Having a difficulty in finding resources for clean water is not a new news for Malaysian people. Difficulty in finding a source of clean water had become a common issue for people as it occurred regularly. In the meantime, having difficulty finding clean water also can give a hard time to perform ablution for any Muslim especially toward traveller.

Furthermore, existing portable ablution bottles or hand-held bidets are inconvenient to use. The storage for the bottles is not large enough to consume for a long period of time when purchasing them. With this all the problem started, it can be solved by designing a friendly users' product and easy to use for all users,

1.3 Research Objective

The purpose of this project is to design a lightweight portable tool to performing ablution easily and making it less traffic in the ablution room. The objectives of the project are:

- a) To design a portable ablution product for each ablution process for motorcyclist.
- b) To develop portable ablution product for motorcyclist

1.4 Scope of Research

This project aims to develop new products in accordance with the product needs. The product will be design by using Autodesk Fusion software for more detailed dimension. After design the product, fabricate the product by using Selecive Laser Sintering (SLS) 3D printer. Finish fabricate the product, compare the designs and pick the best design. Therefore, the project is following the scope of study below:

- Design portable ablution product.
- Fabricate portable ablution product.