



## DESIGN AND FABRICATION OF MINI MACHINE MIXER FOR CEMENT



**BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY  
(MAINTENANCE TECHNOLOGY) WITH HONOURS**

**2022**

## BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA

TAJUK: **Design And Fabrication Of Mini Machine Mixer For Cement**

SESI PENGAJIAN: **2020/21 Semester 1**

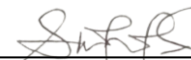
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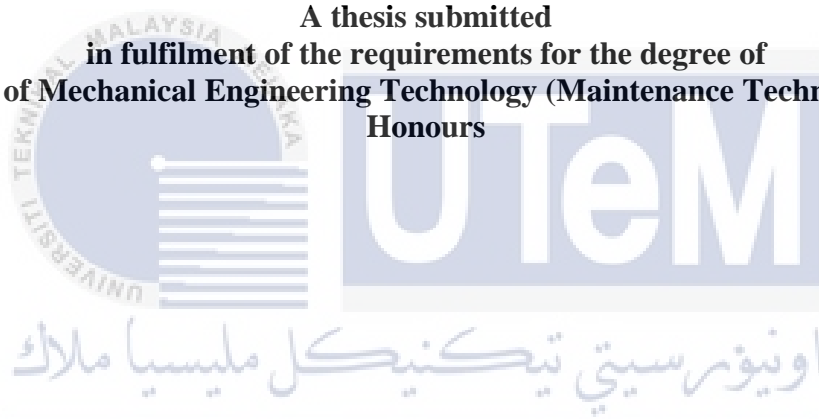
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Honours**

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**DESIGN AND FABRICATION OF MINI MACHINE MIXER FOR CEMENT**

**MUHAMMAD ASYRAF BIN ZAHFARSHAM**

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



**Faculty of Mechanical and Manufacturing Engineering Technology**

**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**2022**

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I declare that this Choose an item. entitled “ Design and Fabrication of Mini Mixer For Cement” is the result of my research except as cited in the references. has not been accepted for any degree and is not concurrently submitted in the candidature of any other degree.

Signature



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## APPROVAL

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Supervisor Name : Puan Siti Norbaya Binti Sahadan

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## DEDICATION

To my beloved mother and father who always there for me

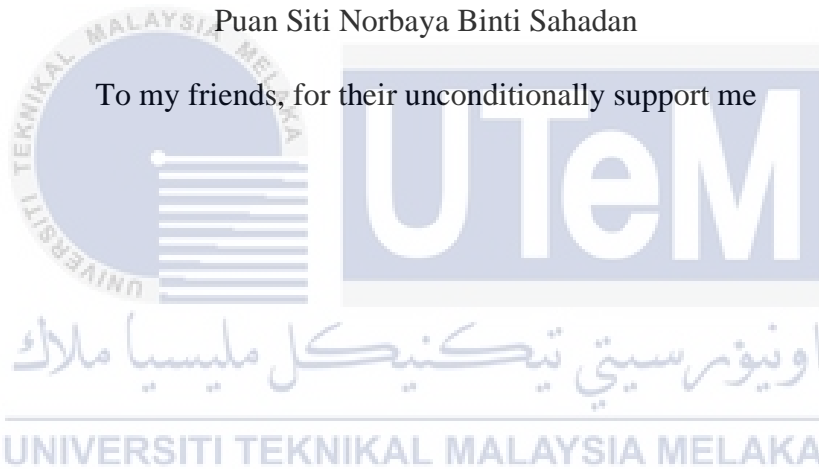
Zahfarsham Bin Ishak and Faridah Binti Rosman

To my siblings

To my lecturer and supervisor, for their guidance and encouragement

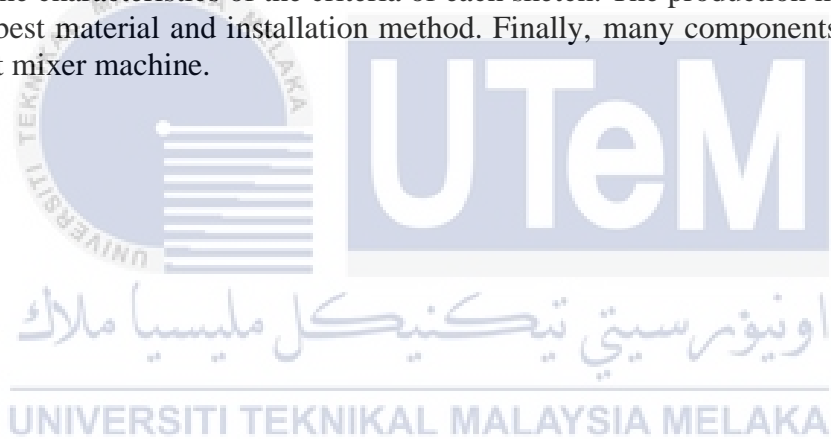
Puan Siti Norbaya Binti Sahadan

To my friends, for their unconditionally support me



## ABSTRACT

A cement mixing machine is a mechanical device used to make a mixture of stone, sand, water, and cement powder to be used as concrete material during the construction process. These machine features are usually large to be used in large construction industry areas. In the early stages, cement mixing is done manually using human energy. However, over time, technologies such as machines have been created to facilitate the process of mixing cement. This study shows that usually this mixer machine is only used in large construction industries. While small construction will only use manpower. This can cause it to take a long time as human energy will experience fatigue compared to machines. Cement mixing will also be uneven compared to a machine that moves consistently. With this study, a mini cement mixing machine was produced to facilitate small-scale construction work. We identify the best methods in producing portable machines with small sizes. We were able to find out the right taste by making sketches using Solidworks. Selection of the best sketch by comparing the characteristics of the criteria of each sketch. The production method also we choose the best material and installation method. Finally, many components make a good mini cement mixer machine.





## ***ABSTRAK***

Mesin pembancuh simen adalah alat mekanikal yang digunakan untuk membuat bancuhan batu, pasir, air dan serbuk simen untuk dijadikan bahan concrete sewaktu menjalankan proses pembinaan. Ciri mesin ini kebiasaannya bersaiz besar untuk digunakan untuk di kawasan industri pembinaan yang besar. Pada peringkat awal, pembancuhan simen dilakukan secara manual dengan menggunakan tenaga manusia. Namun, setelah masa makin meningkat teknologi seperti mesin telah dicipta bagi memudahkan proses pembancuhan simen. Dalam kajian ini menunjukkan kebiasaannya machine mixer ini hanya digunakan pada industri pembinaan yang besar sahaja. Manakala pembinaan yang kecil akan hanya menggunakan tenaga manusia. Hal ini boleh menyebabkan mengambil masa yang lama kerana tenaga manusia akan mengalami keletihan berbanding mesin. Pembancuhan simen juga akan jadi tak sekata berbanding mesin yang bergerak konsisten. Dengan kajian ini mini mesin pembancuh simen dihasilkan bagi memudahkan kerja pembinaan yang berskala kecil. Kami mengenal pasti kaedah yang terbaik dalam menghasilkan mesin yang mudah alih dengan saiz yang kecil. Kami dapat mengetahui citarasa yang sesuai dengan membuat lakaran dengan menggunakan Solidworks. Pemilihan lakaran terbaik dengan membuat perbandingan ciri-ciri kriteria setiap lakaran. Kaedah penghasilannya juga kami pilih bahan dan cara pemasangan yang terbaik. Akhirnya, terdapat banyak komponen yang menghasilkan mini mesin pembancuh simen yang baik.

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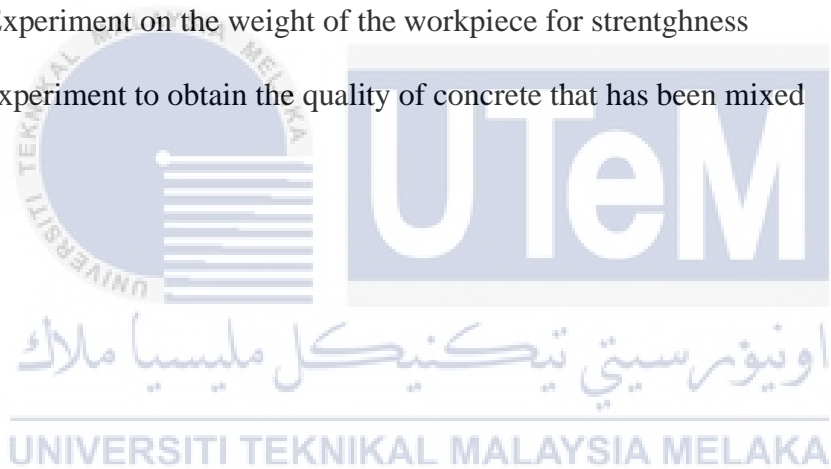
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# CHAPTER 1

## INTRODUCTION

### 1.1 Background

The title that has been chosen for the project is Design and Fabrication of Mini Mixer for Cement. It is one of the initiatives to improve the mixer machine in mixing the cement which has always been used in the construction site. For the record, the function of a concrete mixer is more to mix cement, sandstone, and granite to form concrete according to the confirmed ratio so then it can harden to form an object. The ratio needs to be precise since the solidity of concrete depends on it. Therefore, it is common to find concrete mixers mostly in the civil construction sector as this sector is responsible for house building and more.

Concrete mixers are frequently used to make concrete on the construction site, providing workers plenty of time to use it before it hardens. Concrete can also be mixed by hand as an alternative to using a machine. These devices are used in a variety of industries to prepare concrete on the construction site, giving employees enough time to use the mixture before it hardens. However, using a gigantic mixer machine in a small sector such as billboard and wall floor installation can be troublesome hence the idea of using a mini mixer comes forward. The topic is specifically to identify the importance of mini-mixer machines in the small sector. Since the quantity ratio in small construction being used is far less in comparison to civil construction sites, the installation can be done by contractor manually even though it is time-consuming. The process will be longer because the cement needs to be evenly mixed which can take hours.

Therefore, according to the reasons mentioned above, it is beneficial to provide a mini mixer to small industries and communities as it indirectly helps them to come out with new projects. This concept is a small-scale concept in the construction sector either in the country or abroad. Other than helping small industries, it can also reduce the cost, time, and energy hence this project needs to be implemented seeing to the benefits it can give to everyone.

## **1.2 Problem Statement**

Everything has its downside and advantage. The same thing happens to mini mixer machines. Since the existing mixer machine is compatible only with big construction, many people use their energy by doing it manually. One of the drawbacks of mixing manually is time-consuming because the longer the duration, the longer the process is being taken. In addition, a human's calculation is not as precise as the machine, thus the ratio can be mistakenly assumed by humans. Eventually, it will lead the cement to not be evenly mixed. These are the reasons why the prototype of the mini-mixer machine project has to be invented.

## **1.3 Research Objective**

The objective for this project :

- a) To create and design a small-scale prototype for a mini mixer machine for concrete in construction
- b) To analyze the function of a mini mixer machine for concrete
- c) To get a rate for this mini machine mixer concrete in marketing industries construction.

## 1.4 Scope of Research

The scope of this research are as follows:

- Utilization that has been focused on small sectors such as billboard installation
- The size of the mini mixer is equivalent to 4 liters/8-kilogram load of the paint bucket
- Using motor every time the mixer is being used



## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

Industrial Design is a field involved in the production of products for industry. Products are born of the industry through process design and production process. Engineering Design is a combined technical and scientific field of producing a product that meets the needs, functions, and achievements. The field of Industrial Design and Engineering Design has an approach almost the same in performing the work production of design ideas. A combination of the two in this field has been proven to produce a product that meets the tastes of users in terms of functionality, performance, static value, safety, and comfort. Engineering design serves a specific goal. The approach always starts with a specific purpose in mind. It wouldn't be a random sightseeing tour if it were a voyage with a particular destination.

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So this project must be related to the engineering design to make the design and fabrication of mini machine mixer concrete that must be followed. A concrete mixer is motorised equipment that homogeneously mixes concrete, material such as sand or gravel, and water to generate concrete. Concrete mixers range in size from big industrial mixing trucks to small, portable concrete mixers known as micromixers. A concrete mixer is made up of three main components: a motor, a revolving drum, and, in some cases, a chute. The materials for making concrete spin around inside the drum, mixing uniformly and remaining soft for application and shaping (Ifeanyi, 2018).

## 2.2 Introduction To Engineering Design

Industrial design has become one of the fields which is important among the available fields in this country. In developed countries, this field is among areas that can develop the country's economy such as European countries, the United States, and Japan. Engineering design is a procedure that must be followed. This effective problem-solving strategy is adaptable enough to function in practically any situation. At each stage or phase of the process, engineers get valuable knowledge about the problem and alternative solutions.

The term "engineering design" refers to "design under restraint." Designers must select solutions with the most desirable traits and the fewest drawbacks. However, they must adhere to the scenario's constraints, which may include time, money, and the physical limitations of tools and materials. Engineering design is a methodical and iterative process. It's a series of steps that can be repeated in any order, though not always in the same order. Planning, modeling, testing, and improving designs are examples of steps. Engineering design is a collaborative and social endeavor. This procedure is frequently carried out in small groups comprised of people with varying levels of knowledge and experience. Designers communicate with clients, team members, and others regularly.

Ethics and risk are intertwined, according to Martin and Schinzinger (1983), and identifying dangers is the first step: "Thus, for engineers, measuring risk is a difficult problem. The risks associated with a project or product must first be identified. This necessitates anticipating both intended and unintended interactions between people and technologies and systems. Second, the project's or product's objectives must be determined and prioritized. Third, the costs of risk reduction must be calculated. Fourth, expenses must be weighed against both organizational goals (e.g., profit, quality reputation, avoiding lawsuits) and levels of acceptance of risks to clients and the general public. Finally, the project or product must be tested before being implemented or manufactured(Stacey, 2009)."

## **2.3 Machine Mixer Concrete**

### **2.3.1 Introduction**

A concrete mixer (concrete mixer) is a machine that produces concrete by mixing cement, aggregates such as sand or gravel, and water in equal amounts. The components are mixed in the drum of a conventional concrete mixer. Portable concrete mixers are usually used for small batch projects. Concrete can be mixed on-site, allowing workers enough time to use it before the concrete hardens. Traditional concrete mixes were made by hand, which took a long time and lacked accuracy (Wankhede & Sahu, 2015). Due to growing demand and technical developments, concrete mixers are now utilized to create concrete mixes, even in small size applications. Concrete mixers are equipment that can accurately and quickly mix concrete mixtures of varying strengths. Some concrete mixers are capable of dispensing concrete directly on the building site. Concrete mixers come in a variety of sizes and kinds, depending on their use. Portable concrete mixers can be used in small and medium-sized applications, whereas concrete batching facilities built on the building site can be used in large-scale applications.

### **2.3.2 Types Of Machine Mixer Concrete**

The two main types of mixers are batch and continuous mixers. The first type of mixer produces concrete in batches, whilst the second produces concrete continuously. The first type must be fully emptied, cleaned (if feasible), and reloaded with components for the next batch of concrete after each mixing cycle (Kaitukov et al., 2018). In the first kind, the materials are continuously introduced at one end, while fresh concrete is ejected at the other. The various designs of each type of mixer will now be discussed.

### 2.3.2(a) Batch Mixers

The direction of the axis of rotation distinguishes two types of discontinuous mixers: horizontal or inclined (drum mixer) and vertical (tray mixer). Drum mixers have a rotating drum on the shaft with fixed blades, while pot mixers have blades or spools that rotate around the shaft.

#### a. Drum Mixers

A container with a cross-section similar to that shown in Figure 1 is used in all drum mixers. The blades are linked to the moveable drum's inside. Their primary function is to lift items off the drum as it revolves. The elevated material falls back into the mixer at the bottom of the drum with each rotation, and the cycle begins again. The rotation speed of the drum and, in some mixers, the angle of inclination of the rotation axis are controllable parameters. There are three main types of drum mixers that non-tilting drum, reversing drum, and tilting drum.

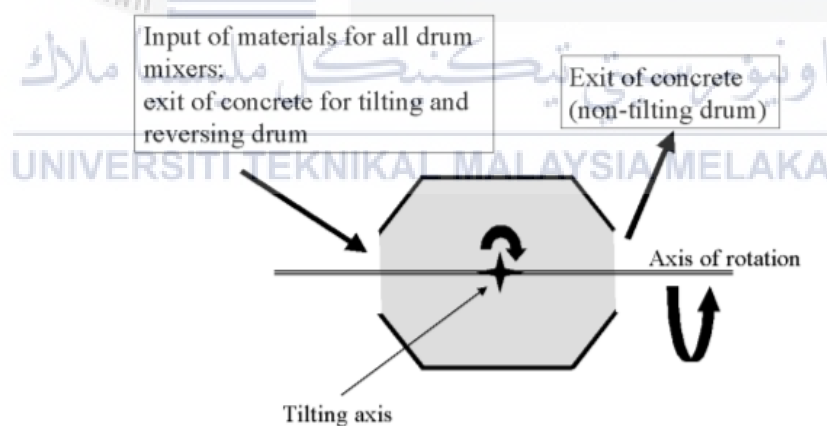


Figure 2.1: cross-section of drum mixers

The non-tilting drum mixer denotes that the drum's alignment is fixed. At one end, materials are added, and at the other, they are expelled (Figure. 2). The reversing drum (Figure. 2) is similar to the non-tilting mixer except that the constituents and concrete are added and discharged through the same aperture. For mixing, the drum revolves in one