POLITEKNIK MALAYSIA

SULTAN SALAHUDDIN ABDUL AZIZ SHAH

FINAL

REPORT

MINI LEMANG COOKWARE

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JABATAN KEJURUTERAAN MEKANIKAL

SESI 2 2021/2022

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This report was submitted to the Mechanical Engineering Department as part of the requirements for the award of the Mechanical Engineering Diploma

MECHANICAL ENGINEERING DEPARTMENT

SESI 2 2021/2022

DECLARATION OF ORIGINALITY AND OWNERSHIP

TITLE: MINI LEMANG COOKWARE SESSION:

JUN 2020

1. We, 1. **AHMAD SYAKIR BIN MOHAMMAD (08DKM20F1077)**
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Are a final student of **Diploma in Mechanical Engineering, Department of Mechanical Engineering , Politeknik Sultan Salahuddin Abdul Aziz Shah,** which is located at **Persiaran Usahawan , 40150 Shah Alam , Selangor**.

2. We recognize that the 'project on' and intellectual property contained in it is the work / design our original without taking or imitate any intellect property right of other parties.
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(761101-02-5730) as a supervisor on the date… .....)ZETTY ROHAIZA BINTI MOHD SAHAK@ISHAK

ACKNOWLEDGEMENT

First of all, we want to raise our hand supplicate gratitude to God for giving us the opportunity to complete this research and project.

In the present world of competition there is a race of existence in which those are having will come forward succeed. Project is like a bridge between theoretical and practical

working. I have taken efforts in this project. However, it would not have been possible without the kind of support and help of many individuals and organizations. I would like to extend my sincere thanks to all of them.

We are heartily thankful to our supervisor Madam. Zetty Rohaiza Binti Mohd Sahak@Ishak whose encouragement, guidance from the beginning to the end of our study, stimulating suggestion and encouragement to complete our research regarding our project, helped us to coordinate our project especially writing proposal and during fabrication process of our project. Apart from that, our supervisor never gets tired to spend her precious time to help us to manage the entrusted research and also never disappoint us when we her help in term of advice and guidance.

We are also pleased to thanks to our companions who gave strong moral support that helps us in completing this report, who gave idea in some part also who gives us support completing this report. This success would not be possible without their endless support upon completing this report. Thank you for the very constructive advice and comments that helps us throughout this research and study of our project ‘ Mini Lemang Cookware’

ABSTRACT

Mini Lemang Cookware is an innovation product created to replace the traditional method of cooking lemang that uses firewood to the method of cooking lemang that uses a gas barrel. This product is also able to cook lemang in a shorter time than existing methods and preserve the original taste of lemang cooking. In addition, it is able to save costs because it does not use expensive automatic machines, it can even save time and minimize equipment. This mini product is very suitable for use by various levels of society, especially for housewives and small traders. The use of stainless steel is used as the main material because it is durable and does not rust. While ceramic material is used as a medium that can trap heat to ensure that the lemang is cooked evenly. The installation of a rubber layer on the handle is a safety aspect that is emphasized to reduce the rate of injury to users. The testing of this innovative product shows that this machine is able to function well and the burning process occurs evenly and maintains the lemang flavor. The use of stainless steel lemang sticks will be paired with mini lemang cookware to restore it can be used at any time. This project needs to be equipped easily to handle and the time to burn lemang is also short.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Lemang is a type of traditional Malay food that is very popular especially when celebrating festivals. But now, lemang is also served throughout the year. The making of lemang starts from the process of preparing glutinous rice and coconut milk that is put into a bamboo section lined with banana leaves before being baked until cooked. The method of cooking lemang is to use firewood as burning device and requires a slightly larger area to burn lemang. In addition, the fire also needs to be constantly monitored by the lemang burner so that the lemang does not overcook. The time taken to cook lemang traditionally takes around 3 to 4 hours for lemang to cook.

Mini Lemang Cookware is an innovation product created to replace the traditional method of cooking lemang that uses firewood to the method of cooking lemang that uses a gas barrel. This product is also able to cook lemang in a shorter time than existing methods and preserve the original taste of lemang cooking. In addition, it is able to save costs because it does not use expensive automatic machines, it can even save time and minimize equipment. This mini product is very suitable for use by various levels of society, especially for housewives and small traders. The use of stainless steel is used as the main material because it is durable and does not rust. While ceramic material is used as a medium that can trap heat to ensure that the lemang is cooked evenly. The installation of a rubber layer on the handle is a safety aspect that is emphasized to reduce the rate of injury to users. The testing of this innovative product shows that this machine is able to function well and the burning process occurs evenly and maintains the lemang flavour

1.2 Background research

In this study, to cook lemang in a traditional way is quite difficult because it requires the preparation of firewood and a large place to burn lemang, in addition to that the time that needs to be taken to burn lemang is quite long and the way to burn lemang

traditionally is also quite difficult because lemang needs to be constantly watched so as not to burn

This project is targeted at family groups and lemang businesses. This project can help lemang sellers cook lemang quickly and easily. apart from that, the taste of lemang also does not change and is cooked perfectly just like using the traditional method but easier and faster. Families can also use this project to cook lemang as it is suitable for families who live in housing that does not have a large space to cook lemang traditionally.

this project can also help family members to increase family income by selling lemang using this project. because this project is light and easy to use. the amount of lemang that can be produced in one time is also a lot according to the size of the lemang bamboo and the project

1.3 Problem Statement

- Careful observation and research during the lemang burning process A lot of energy is used during the combustion process.
- Uneven combustion.
- Requires expertise and experience in cooking lemang
- The combustion chamber is wide and affected by the weather.

1.4 Objective

- Designing innovative products for cooking lemang
- Produce products that make work easier and reduce the use of man power(From more than 2 people with traditional way to 1 people only)
- Build an innovative product that can operate with minimal control(easy to handle and can easy to be moved)

1.5 Research Questions

This study will answer the following research questions:

- Have you ever had a problem with space and place to cook lemang?
- In your opinion, is it difficult or not to burn lemang using the traditional way?
- How do you get a lemang dish?
- Is it difficult for you to get lemang dishes?

1.6 Scope Project

'Mini Lemang Cookware' is built to simplify the traditional way of cooking lemang that takes a long time to a simpler and faster way. In addition, lemang can be cooked

perfectly and there are business opportunities. The scope in designing and develop the Mini Lemang Cookware.

- Housewife
  Small lemang sellers Kiosk traders

- The bamboo used is sized:
  - height 30 cm
  -diameter between 7-10 cm

1.7 Important Research

This Mini Lemang Cookware gets good results in simplifying how to cook Lemang. In addition, it can also help households who want to increase their income by selling lemang. Next, with the existence of this project, air pollution can be reduced when cooking lemang, so the problem of eye pain and shortness of breath near the place where lemang is burned can be avoided.

1.8 Summary Chapter

With the Mini Lemang Cookware, can save time and make cooking lemang easier. Therefore, in chapter 2 there will be a study and examine of this issue more closely.Chapter 2 is a previous study that has to investigate to ensure this study is accomplished.

CHAPTER 2

LITERATURE RIVIEW

2.1 INTRODUCTION

Whether in the city or the rural, Malay traditional food is frequently a required meal during the Hari Raya Aidilfitri celebration season. Food options such as lemang, ketupat, rendang, serunding, and traditional desserts will undoubtedly enliven the celebration of Lebaran, which occurs once a year. What is certain is that, as a result of the positive response from the community, the menus are not only popular during the holiday season, but they are also now conveniently available at any time. For example, consumers may still buy lemang, which is offered in a variety of locations such as retail malls and roadside shops. In fact, there are rulers of this cuisine who prepare lemang straight at their booths so that purchasers may grab it while it is still hot. The dish is growing increasingly popular, pushing merchants to include it on the main menu as an attraction.

Lemang is the main traditional food for the Malays when celebrating Hari Raya Aidilfitri or Hari Raya Aidiladha. But now, lemang can be obtained at any time. The taste of lemang is quite unique because it is made from lemang bamboo as a container to put glutinous rice and coconut milk into the bamboo. In addition, banana leaves are also used to wrap glutinous rice and coconut milk before being put into bamboo. The method of cooking lemang is to use firewood as fuel and requires a slightly larger area to burn lemang. In addition, the fire also needs to be constantly monitored by the lemang burner so that the lemang does not overcook. The time taken to cook lemang traditionally takes around 3 to 4 hours for lemang to cook.

Most people in Malaysia cook lemang using firewood especially during the Hari Raya festival season.

Figure 2.0 : Lemang baked in traditional way.

Apart from that, there are also some communities that cook lemang using firewood for the purpose of buying and selling.

Figure 2.1 : Lemang traders use traditional methods to sell lemang

2.2 HISTORY

Figure 2.2 : Traditional Lemang

Figure 2.3 shows lemang cooked in traditional way. In conventional method, the process of baking lemang involved several steps.Firstly, bamboo stalks are cut to equal length between 500mm to 600mm. A banana leaves are cut to suitable sizes, rolled and placed into the bamboo stalk to cover the inner surface (Adib, 2010).Four kilogram of glutinous rice, two kilogram of coconut milk and four liter water are needed assuming ten stalks of lemang are to be baked. The ingredients are then mixed together with relevant amount of salts added to have a little bit of a salty taste.Then the mixture of glutinous rice, coconut milk, water and salts are poured into the bamboo stalks. The measurement for the mixture to be inserted into the bamboo stalks should be three inches for the glutinous rice and two inches for the mixture of coconut milk, water and salts from the top of the bamboo stalk. Figure2.2 summarizes the measurement of lemang ingredients (Haddy, 2004). After all the bamboo has been filled, the baking process can begin. The conventional method on baking lemang used firewood as the heat source. A wide an open space are needed in order to setup the firewood. The firewood should be arranged on a long stretched line so that a number of lemang can be bake by leaning the stalks near the heat source.The lemang will be exposed to heat until the lemang loss around 22% of its initial weight (Wahab, 2005). In the middle of that process, the lemang is to be constantly turn so that both

side of the lemang gets equal exposure to heat and bake evenly. Furthermore, the glutinous rice and the coconut milk inside of the bamboo stalk will expand until overflows occur. When that happens, the lemang needed to be pounded vertically to the ground in order to compress the stuffing inside it before leaning it back to the heat to totally bake the lemang (Semat, 1997). Conventional method to bake lemang has lot of drawback. It is time consuming, requires lot of manpower, high in cost and needs high experience and skills to manage the process as well as to produce a perfectly baked lemang.

2.3 PREVIOUS RESEARCH

However, several factors must be considered while preparing a lemang burning stove, such as the necessity for a large area, the availability of fuel, the need for constant monitoring, and the operators' exposure to hot materials. Despite the intricacy, a group of Pusat Giat Mara Petaling Jaya Utara students and teachers have successfully built a basic lemang burning stove move that utilities electricity. Using internet-based sources. The effort should be commended since, in addition to simplifying the process of baking lemang, using the stove is also cleaner, faster, less expensive, and, most importantly, it suits the modern taste.It may also indirectly give a more comfortable burning ambiance because it does not use firewood, produces no pollutants such as smoke, and is not exposed to heat. More interestingly, in a very small area, lemang may still be burnt to suit consumer demands, with outcomes similar to standard baking processes. Mesin Lemang Toaster was created in 2004 by a group of designers at the institute that included four trainees and one teaching staff. According to its project leader, Jameran Panot, the machine's design is intended to assist small and medium-sized enterprises (SMEs) as well as households in producing varied baked-food-based goods.

2.4 THEORY

As known to produce lemang is by adding glutinous rice and coconut milk into bamboo segments lined with banana leaves. According to Marina Mustafa (2009) Memorable Recipes for Malay Occasions. Then burned with coals as well turned around to make sure it cooks perfectly. This cooking process is necessary takes quite a long time and it is not an easy process. Look at it demand for that traditional food that is always there throughout the season, Zul Design Autotronic offers an automatic way of cooking lemang. According to the founder of Zul Design Autotronic, Zulkifli Haron (2014), though the technology uses machines, but the concept is still the same, which is with using fire heat to maintain the authenticity and also the delicious taste of the food the traditional "What makes it different is that lemang doesn't need to be overcooked long, and there is no need to turn the lemang stem. "As a result, I got it produced in large quantities in addition to being able to save time and manpower".

The machine works by just turning on the lighter button on the machine, then the lemang arranged around the cooking space neatly. With the method of heat being evenly circulated in

the machine, all the lemang sticks can receive the same heat and produce an even burn. The machine that uses this even burning method is able to produce lemang capacity of up to 7-10 sticks in one hour.

2.5 STUDY OF COMPONENTS USED

1. MILD STEEL

Figure 2.3 : Mild Steel

The basic component of steel, also known as cast iron or cast iron, is iron. Depending on the grade, the alloy's carbon concentration ranges from 0.02% to 1.7 or 2.04% by weight (C:100010,8.67Fe).

The cheapest and most efficient compound material for iron is carbon, however other compound elements like manganese and tungsten are also employed. The hardening properties of carbon and other elements prohibit the separation of iron atoms' lattice jewels (crystal lattice) by free sliding. Hardness, flexibility, and elasticity of the resulting steel are controlled by the number of various compounds and the form in which they are present (solute element, phase precipitated). Iron with a higher carbon content might be stronger and more durable than iron, but it is also more delicate. At 1149 °C, the maximum solubility of carbon in iron (in the austerity area) is 2.14% by weight; higher carbon concentration or lower temperature forms cementation. Because of their lower melting rate, iron compounds with a greater carbon content are known as cast iron.

Steel differs from wrought iron in that it includes only modest quantities of other elements, but it also contains 1-3% slag by weight in the form of particles spreading in one direction, creating the appearance of iron veins. It is more corrosion resistant than steel and easier to solder. However, this word is no longer often used in the steel industry. It was usual at the time to talk to the "iron and steel business" as if it were a single substance, but historically, it is a separate release.

2. CERAMIC MATERIAL

Figure 2.4 : Ceramic Material

Ceramic materials are unique due of their characteristics. They have a high melting point, poor electrical and thermal conductivity, and a high comprehensive strength. They are also often rigid and brittle, with high chemical and thermal stability. Ceramic materials are classified into two types: conventional ceramics and advanced ceramics. Traditional ceramics are made of clay, silica, and feldspar and are manufactured from clay, silica, and feldspar. Traditional ceramics, as the name implies, are not expected to satisfy specific strict criteria after manufacture, therefore cheap technology is employed for the majority of the production process.

3. Gas Stove

Figure 2.5 : Gas Stove

A gas stove is one that uses combustible gas, such as syn gas, natural gas, propane, butane, liquefied petroleum gas, or another flammable gas, to power it. Prior to the introduction of gas, cooking stoves used solid fuels such as coal or wood. The first gas stoves were invented in the 1820s, and in 1836, a gas stove factory was created in England. This new cooking method has the benefit of being simply adjusted and switchable while not in use. The gas stove, on the other hand, did not become a commercial success until the 1885s, by which time piped gas was available in British cities and big towns. In the middle of the twentieth century, the stoves became popular on the European Continent and in the United States. When the oven was integrated into the base and the size was lowered to better blend in with the rest of the kitchen furniture, gas stoves became more popular. By the 1910s, manufacturers began to enamel their gas stoves to make cleaning simpler. The gas was originally ignited by a match, which was later replaced with the more practical pilot light.

4. Liquefied Petroleum Gas (LPG)

Figure 2.6 : LPG

Liquefied petroleum gas (LPG or LP gas) is a combustible combination of hydrocarbon gases that includes propane, propylene, butylene, isobutane, and n-butane. LPG is a fuel gas that is used in heating appliances, culinary equipment, and automobiles. It is increasingly being utilized as an aerosol propellant and a refrigerant to replace chlorofluorocarbons in an effort to prevent ozone layer damage. When used as a vehicle fuel, it is commonly referred to as autogas or just gas. LPG blends that are predominantly propane (C_3H_8), mostly butane (C_4H_{10}), and, most typically, mixes that comprise both propane and butane are bought and sold. In the northern hemisphere, the mixtures contain more propane in the winter, and more butane in the summer.

2.6 STUDY OF DESIGN SPECIFICATIONS IN THE MARKET

Otherwise, the comparison method of baking legman among Mini Angle Cookware, MARDI Mini Mangel Machine and traditional way has shown in Table 3.2 below.

Method / Criteria	Mini Mangle Cookware	MARDI Mini Lemang Machine	Traditional
Project			
Main Components	Aluminium	Steel	Wood or Steel
Sizes	60cm X 60Cm X 70 cm	50cm X 50cm X 50cm	Depending on the size of the fire place
Heat Source	Liquefied Petroleum Gas (LPG)	Electricity	Fire wood
Lemang Quantity	10 lemang sticks (H:20cm D:5cm)	7 lemang sticks (H:10cm D:5cm)	20 and above lemang sticks (depending on the size of the fire place to burn lemang)
Duration time for baked lemang (same quantity)	1 hour	1 hour to 1 hour and 30 minutes	More than 2 hours
Effort to cook lemang	Minimize the work process and energy for employees	Minimize the work process and energy for employees	Work process and maximum energy required
Man power to handle (for big quantity of lemang)	1 people	1 people	More than 2 people

Table 2.3 : Comparison of baking lemang method

2.7 CONCLUSION

In conclusion, numerous methods are developed from the original creator components that were utilized in this project. In comparison to the material investigated, the components were discovered to be quite suited for use in the completion of this product. As can be seen, designing a product for the lemang cooking process is neither a simple or quick task. The components utilized are critical in producing a long-lasting product and making it easy for people to prepare lemang. Mini Lemang Cookware is a product that incorporates components from another

sector. Because ceramic material has low heat conduction qualities, this product is able to trap good heat.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

The aim of the research methodology used to derive the appropriate data so that the study could continue to the next step. The preliminary investigation is one of the study collection, processing and analysis of data conducted in a systematic and efficient way to solve a problem. Thus, the purpose of this study was to obtain answers through the use of a scientific step with systematically and scientifically. This chapter will explain about the study, the respondents; the methods used to obtain research data from respondents such as questionnaires, interviews,

observations, and so on and how to analyse the data obtained from the respondents. Thus, any need to study the methodology as a way to gain insights. The methodology also requires a systematic technique to meet the requirements of scientific, scientific methods and quality. The methodology in this chapter refers to the procedure to implement the study or information to achieve the objectives of the study. The study will be more orderly and meticulous in all aspects.

3.2 FLOWCHART

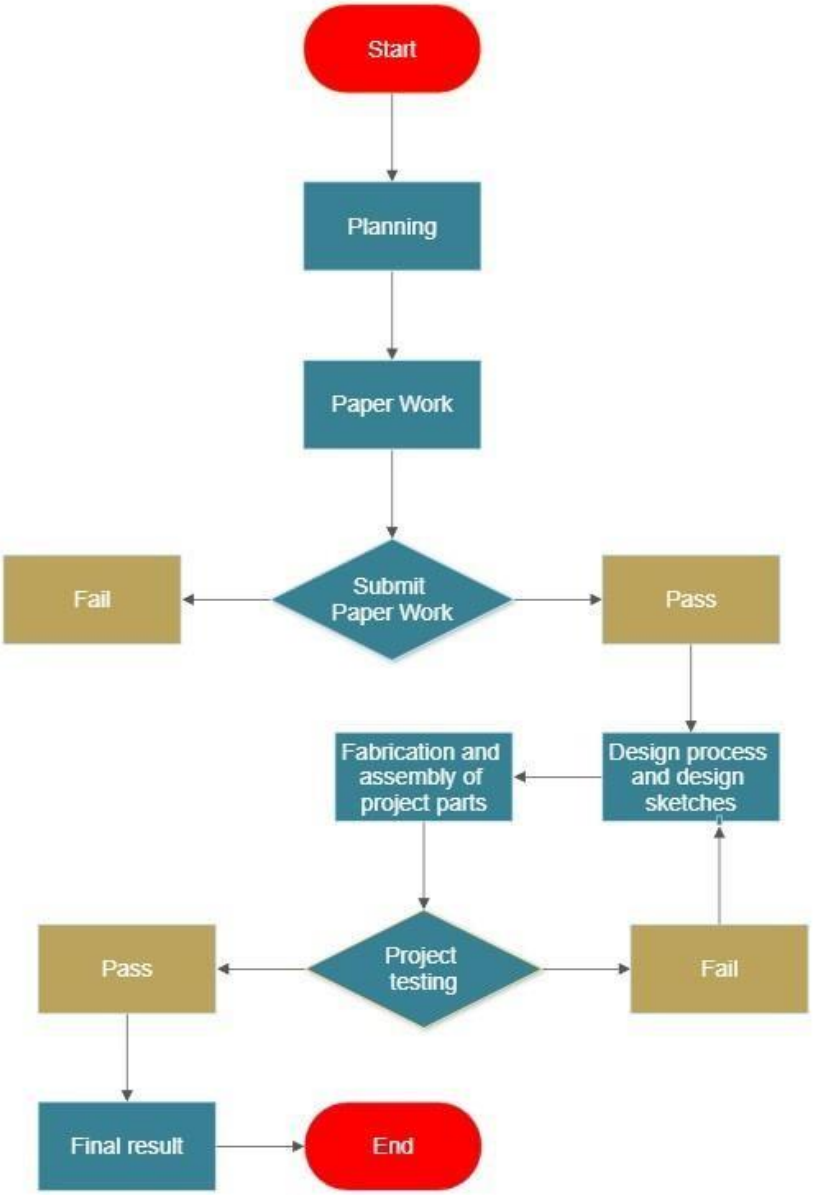


FIGURE 3.1 FLOWCHART PROCESS

i. Literature Review

The literature review is aimed to obtain information and data from previous researchers to know the background and the problems of this Mini Lemang Cookware project. With an earlier stage of studies, every problem can be identified and addressed. Therefore, a Mini Lemang Cookware was established. Any problems that occurred in connection with blind stick are combined in a

project that is innovative Mini Lemang Cookware. Mini Lemang Cookware is more focused the perfection of cooking lemang without changing the taste of traditional lemang.

ii. Generation and Selection of Concept

In a process of designing, generating, selecting design concepts and selecting components needs to be done in detail so that the project produced effective and a good impact on users.
This is because effective project can be used in a long time and more durable. It also helps attract interested user.

iii. Details Design

In a process of designing, generating, selecting design concepts and selecting components needs to be done in detail so that the project produced effective and a good impact on users.
This is because effective project can be used in a long time and more durable. It also helps attract interested user.

iv. Equipment

The project involves the use of existing items such as gas stoves and rubber pipes. In addition, the use of stainless steel is used to make projects so that they are more durable and ceramic materials are used to trap heat so that the lemang can be cooked perfectly.

v. Selection and Provision of Materials

The selection of the right material is very important to create a good and effective project.
From here, the choice of material depends on the type of components used. The components need to be studied first in terms of price, durability and suitability.

vi. Installation and Packaging

The installation of the project will be made after planning the steps and materials have been selected so that the installation is complete and perfect. This is to ensure that the project can function properly and can be used without any damage and any additional cost.

vii. Availability and Cost

In the manufacturing process, costs should be emphasized so that expenses do not exceed the scope of expenses. Therefore, the importance of the survey should be done before the selection of components is made and the existing materials should also be taken into account to reduce the cost of the project.

vii. Ergonomics Analysis

Ergonomic analysis is done so that the project does not run away from the main purpose. The main purpose of this project is to simplify the traditional way of cooking lemang to an easier way and without losing the original taste of lemang. In addition, this project also aims to increase household income by selling lemang

ix. Prototype Testing

A model has been developed to test whether lemang can be cooked perfectly or not, the time taken to cook lemang according to a certain temperature is also recorded. changes in the taste of lemang cooked using this project are also taken into account to ensure that there is no change in the taste of lemang cooked using Mini Lemang Cookware and cooked using traditional methods.

3.3 Mini Lemang Cookware Components

i. Stainless Steel

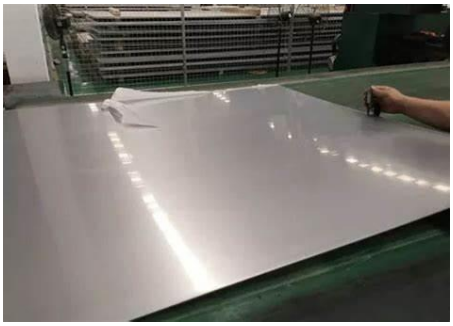


FIGURE 3.2 STAINLESS STEEL

The main material used to produce Mini Lemang Cookware is stainless steel. In addition to stainless steel iron, this strong stainless steel is also resistant to weather. Stainless steel is commonly seen as kitchen accessories, cutlery, and cookware. From knife blades with sharp edges to molded shapes like cookers, grills, sinks, and saucepans- the presence of stainless steel is essential. It's also used as a finish for refrigerators, countertops, and dishwashers.

ii. Gas Stove

FIGURE 3.3 GAS STOVE

The gas stove is used to turn on the fire so that it can heat the ceramic material for the cooking process. Gas stoves are valued for their quick heating response and simple temperature adjustment. If you've never used a gas stove, however, you may feel a little confused when first operating one. But once you get the hang of using a gas stove, they are just as easy to use and maintain as their electric counterparts. As long as you take good care of your gas stove and use safety precautions while cooking, you should be able to use it with ease

iii. Low Pressure Gas Regulator

FIGURE 3.4 LOW PRESSURE GAS REGULATOR

Low Pressure Gas Regulator is used to control the flow of gas into the gas stove A gas regulator reduces high pressure from the gas bottle to a consistent regulated pressure as required by the application. Gas regulators are used for compressed gases liquefied under pressure, such as LPG gas regulators for SWAP‘n‘GO LPG bottles and larger household gas cylinders delivered by Elgas.

iv. LPG Hose

FIGURE 3.5 LPG HOSE

These are two types of cylinder regulator hose in use by Flogas: (a) the smaller-diameter high-pressure hose (on the left in the picture) is for use with high-pressure regulators, and (b) the larger diameter for low-pressure regulators. Always ensure the hose size is suitable for the nozzle you are using. Use a high-pressure hose with a high pressure regulator. Do not use a high-pressure hose with a low-pressure Propane regulator.
Stock codes: low pressure hose 1370, low pressure hose clips 1376, high pressure hose 1373, high pressure hose clips 1375.LPG hose is used to flow gas from the gas barrel to the gas stove to light the fire.

v. Gas

FIGURE 3.6 GAS

LPG or liquefied petroleum gas is a by product of crude oil and natural gas that is rich in hydrocarbons. It is an odorless, non-toxic, clean burning, and an environmentally friendly fuel with almost zero level of pollutants. The greatest advantage of LPG is that it can be easily transported.gas is used as a fire source to heat the ceramic material in the Mini Lemang Cookware

vi. Thermometer

FIGURE 3.7 THERMOMETER

A thermometer is a temperature measuring instrument that is used universally. Temperature, as we all know, is the unit of measurement for heat. Temperature is measured in units such as Celsius (C), Kelvin (K), and Fahrenheit (F).The thermometer is used to check the temperature inside the Mini Lemang Cookware so that the lemang can be cooked perfectly and can estimate the time it takes for the lemang to cook.

vii. Ceramic Material

FIGURE 3.8 CERAMIC MATERIAL

Ceramic material is used in Mini Lemang Cookware as a heat trap material to cook lemang so that lemang can be cooked evenly. Ceramics are special materials with many applications in almost all the engineering disciplines. But their importance has often been underestimated due to the fact that many people believe that ceramics are all about pottery and tiles. Today's ceramics industry is one of most rapidly advancing concerns in many parts of the world including USA, where the advanced ceramic market is over 13 billion US dollars. Ceramic industry began to expand as a modern industry with the attribution of new techniques and knowledge gained in the 1970s. Since then it has also been one of most competitive industries in the market

viii. RUBBER PIPE

FIGURE 3.9 RUBBER PIPE

Pipe rubber is used as a safety material that is placed on the handle of the mini lemang cookware so that it can insulate the heat. Rubber has become commonplace! In every American city, international destination, building, machinery, and even on people, it is easy to point to some rubber part. Praised for its elastic quality, a rolls of rubber is fabricated to meet the needs of a variety of industry and have become one of the world's most useful materials in a myriad of applications. If you were wondering what is rubber used for, well look around you. Some of these uses may play a more critical role in our society, such as tires keeping cars on the road. Some uses are less significant, like children's toys. Others are tailored for the average consumer looking to keep their horses comfortable and away from hard floors. And some uses are cosmetic, like silicone rubber bracelets worn partly to bring awareness to a cause, and part to be fashionable. Rubber uses and applications are virtually endless and yes we have certainly come across some interesting uses of rubber. Rubber's driving force has been the automotive industry with its needs to tires, gaskets, and interior trim for cars. The 21st century continues to see rubber's growth and ingenuity again contingent upon the discarded tire produced by "Big Auto." Used tires and their offshoot, tire derived products (TDP's) are the raw materials for new, affordable, and exciting consumer products. Not only are rubber suppliers producing more recycled rubber sheets, they are clearing out more and more of abandoned hazardous tires

3.4 The Finishing Project

FIGURE 4.0 FINISHING PRODUCT

Mini Lemang Cookware

3.5 Project Design (specific 2D Sketch)

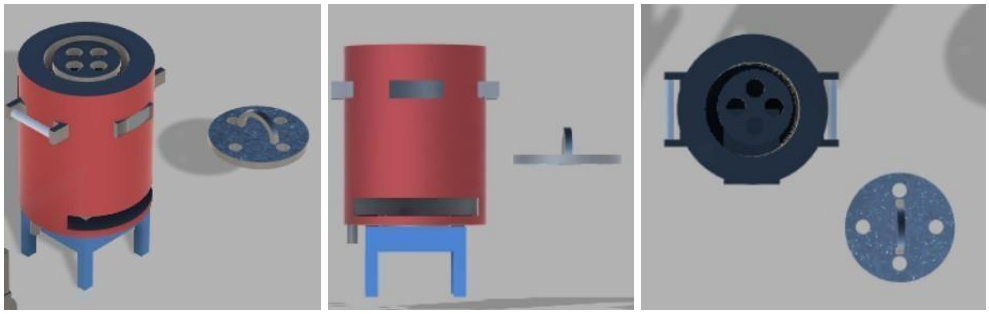


FIGURE 4.1 PROJEK DESING 2D SKET

3.6 Technical Drawing (Specific Design 2D Sketch)

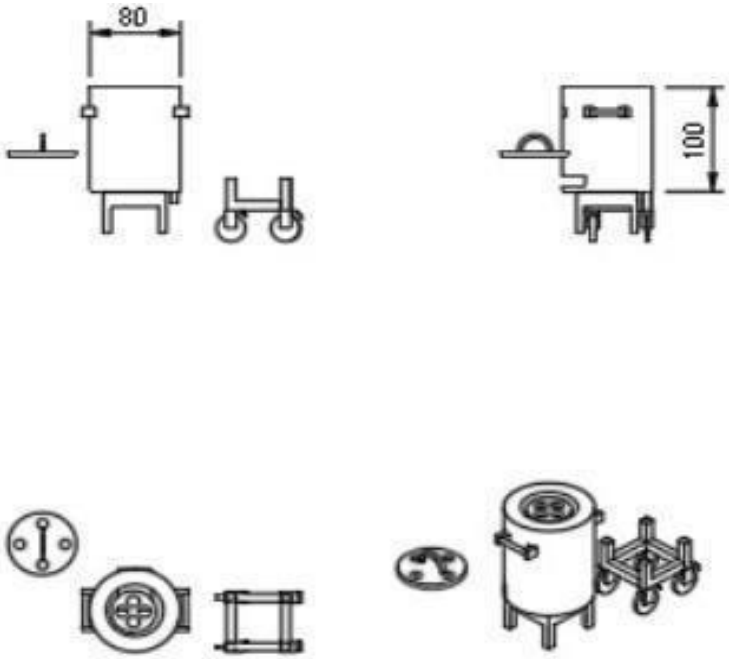
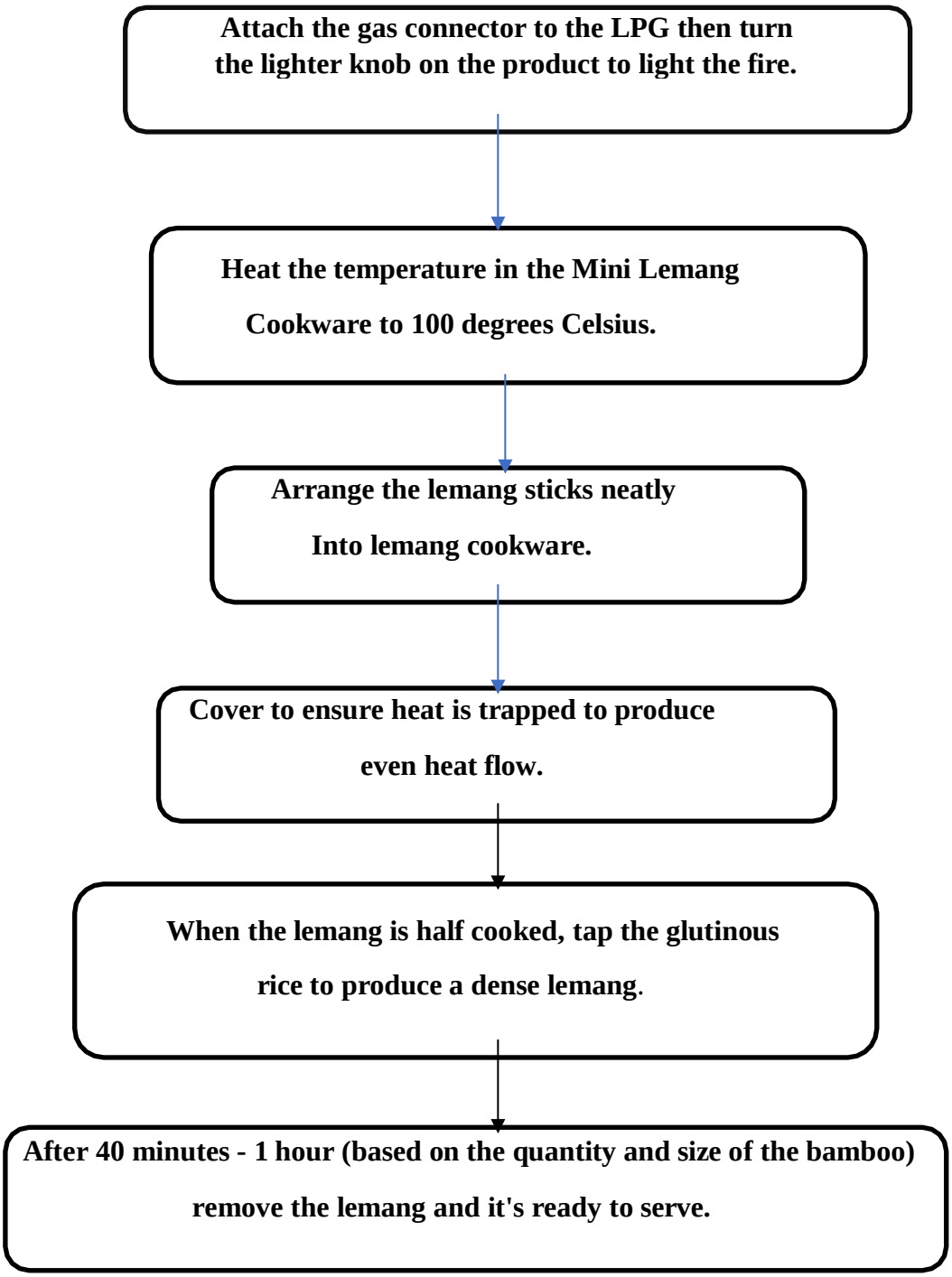


FIGURE 4.2 TECHNICAL DRAWING

3.6 WORKING PROCEDURE



Ceramic material is the material used in mini lemang cookware to cook lemang. The ceramic material will be heated by the fire and it will be able to burn the lemang perfectly. Firstly, Attach the gas connector to the LPG then turn the lighter knob on the product to light the fire**.** Secondly , Heat the temperature in the Mini Lemang Cookware to 100 degrees Celsius. with a temperature of 100 degrees Celsius, lemang can be cooked for around 50 to 55 minutes. Thirdly, Arrange the lemang sticks neatly into mini lemang cookware. The number of patang lemang that can be put into mini lemang cookware at one time is around 12 to 15 sticks. Fourth, Cover to ensure heat is trapped to produce even heat flow. Next, when the lemang is half cooked, tap the glutinous rice to produce a dense lemang. If the user does not want to do this, it is also okay because it is at the user's will to cook lemang. Last but not

least, After 40 minutes - 1 hour (based on the quantity and size of the bamboo) remove the lemang and it's ready to serve.

3.7 SELECTION OF CERAMIC MATERIALS

the concept of burning lemang in Mini Lemang Cookware is a heat trap concept where the fire that heats the ceramic material allows the space inside the Mini Lemang Cookware to trap heat and thus be able to cook lemang in a circular motion. Ceramic materials are used in mini lemang cookware because ceramic materials can withstand high temperatures. Ceramic materials can withstand temperatures of more than 1600 degrees Celsius. In addition to ceramic materials, there is a mixture of chemicals that are used on ceramic materials to allow ceramic materials to help the lemang burning process. The selection of this fiber blanket ceramic material is also because its light weight can help reduce the weight of Mini Lemang Cookware products. In addition, the heat transfer of ceramic materials is also suitable for use in the manufacture of Mini Lemang Cookware products.

3.8 SELECTION OF STAINLESS STEEL

Stainless steel is used in the construction of Mini Lemang Cookware because stainless steel has durable properties. Stainless steel iron also has many types. The type of stainless steel used to make Mini Lemang Cookware is stainless steel 420. This type of steel is very suitable for making cooking tools. Among the materials made using this type of iron are spoons, forks and knives. The selection of stainless-steel type is also important in building Mini lemang Cookware to ensure that lemang can be eaten safely.

3.9 SUMMARY OF CHAPTER

In conclusion, the selection of materials used to produce Mini Lemang Cookware is chosen on the basis of the appropriate materials. With the selection of suitable materials, Mini Lemang Cookware can operate well and can last for a long time.

CHAPTER 4
ANALYSIS AND RESULTS

4.1 Introduction

From the project that we have made, we have successfully create a lemang stove that can cook lemang very well.The main component in this project is ceramic material was well function and it makes our project going well.

4.2 Analysis

Every project that is implemented and carried out must have its own advantages and disadvantages. After completing the manufacturing process and testing this project, it was found that this Mini Lemang Cookware has several advantages and disadvantages. Among the advantages of the Mini Lemang Cookware are as stated in the objective, which is Designing innovative products for cooking lemang,Produce products that make work easier and reduce the use of man power andProduce innovative products that can operate with minimal control. The time required to cook lemang is short compared to other lemang cookers. In addition, this Mini Lemang Cookware also only uses a little manpower due to its easy handling. Due to the light weight of this project , this project is easy to carry anywhere.

4.3 Result

	Mini Lemang Cookware
Project	
Main Components	**Aluminium**
Sizes	**60cm X 60Cm X 70 cm**
Heat Source	**Liquefied Petroleum Gas (LPG)**
Lemang Quantity	**10 lemang sticks (H:20cm D:5cm)**
Duration time for baked lemang (same quantity)	**1 hour**
Effort to cook lemang	**Minimize the work process and energy for employees**
Man power to handle (for big quantity of lemang)	**1 people**

My IPO registration

This project has been registered in my ipo with the help of our supervisor. To successfully register in my ipo also takes a few weeks to get approval.

Figure 4.0 MyIPO logo

4.4 Research Findings

Lemang is the main traditional food for the Malays when celebrating Hari Raya Aidilfitri or Hari Raya Aidiladha. But now, lemang can be obtained at any time. The taste of lemang is quite unique because it is made from lemang bamboo as a container to put glutinous rice and coconut milk into the bamboo. In addition, banana leaves are also used to wrap glutinous rice and coconut milk before being put into bamboo. The method of cooking lemang is to use firewood as fuel and requires a slightly larger area to burn lemang. In addition, the fire also needs to be constantly monitored by the lemang burner so that the lemang does not overcook. The time taken to cook lemang traditionally takes around 3 to 4 hours for lemang to cook.

Most people in Malaysia cook lemang using firewood especially during the Hari Raya festival season.

Figure 4.1 : Lemang baked in traditional way.

Apart from that, there are also some communities that cook lemang using firewood for the purpose of buying and selling.

Figure 4.2 : Lemang traders use traditional methods to sell lemang

HISTORY OF LEMANG

Figure

4.4 : Traditional Lemang

Figure 4.4 shows lemang cooked in traditional way. In conventional method, the process of baking lemang involved several steps.Firstly, bamboo stalks are cut to equal length between 500mm to 600mm. A banana leaves are cut to suitable sizes, rolled and placed into the bamboo stalk to cover the inner surface (Adib, 2010).Four kilogram of glutinous rice, two kilogram of coconut milk and four liter water are needed assuming ten stalks of lemang are to be baked. The ingredients are then mixed together with relevant amount of salts added to have a little bit of a salty taste.Then the mixture of glutinous rice, coconut milk, water and salts are poured into the bamboo stalks. The measurement for the mixture to be inserted into the bamboo stalks should be three inches for the glutinous rice and two inches for the mixture of coconut milk, water and salts from the top of the bamboo stalk. Figure2.2 summarizes the measurement of lemang ingredients (Haddy, 2004). After all the bamboo has been filled, the baking process can begin. The conventional method on baking lemang used firewood as the heat source. A wide an open space are needed in order to setup the firewood. The firewood should be arranged on a long stretched line so that a number of lemang can be bake by leaning the stalks near the heat source.The lemang will be exposed to heat until the lemang loss around 22% of its initial weight (Wahab, 2005). In the middle of that process, the lemang is to be constantly turn so that both side of the lemang gets equal exposure to heat and bake evenly. Furthermore, the glutinous rice and the coconut milk inside of the bamboo stalk will expand until overflows occur. When that happens, the lemang needed to be pounded vertically to the ground in order to compress the stuffing inside it before leaning it back to the heat to totally bake the lemang (Semat, 1997).

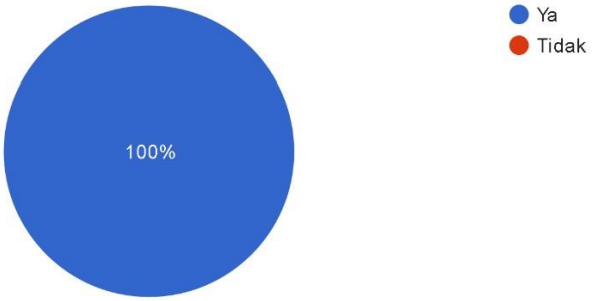
Conventional method to bake lemang has lot of drawback. It is time consuming, requires lot of manpower, high in cost and needs high experience and skills to manage the process as well as to produce a perfectly baked lemang.

4.3 ANALYSIS

This is one of result from the questionnaire:

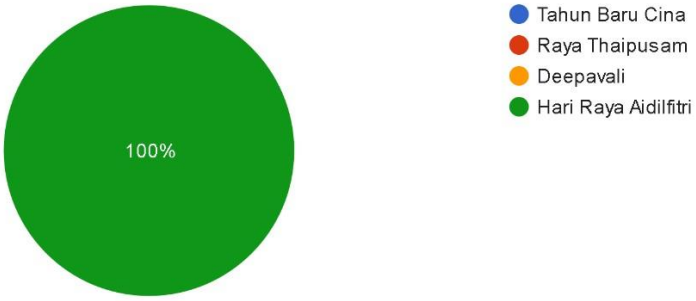
Pada pendapat anda, adakah wajar untuk mencipta sebuah alat membakar lemang yang mudah untuk dialihkan dan tidak menggunakan banyak ruang?

10 responses



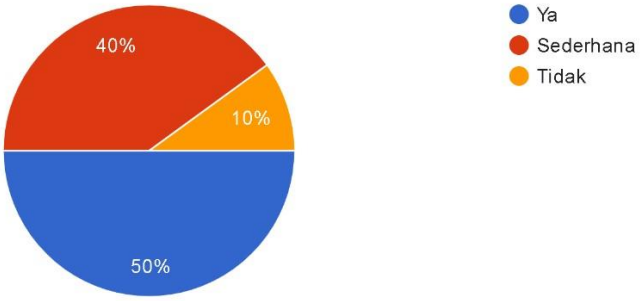
Lemang merupakan makanan tradisional pada waktu perayaan apa?

10 responses



Pada pendapat anda, sukar atau tidak untuk membakar lemang menggunakan cara tradisional?

10 responses



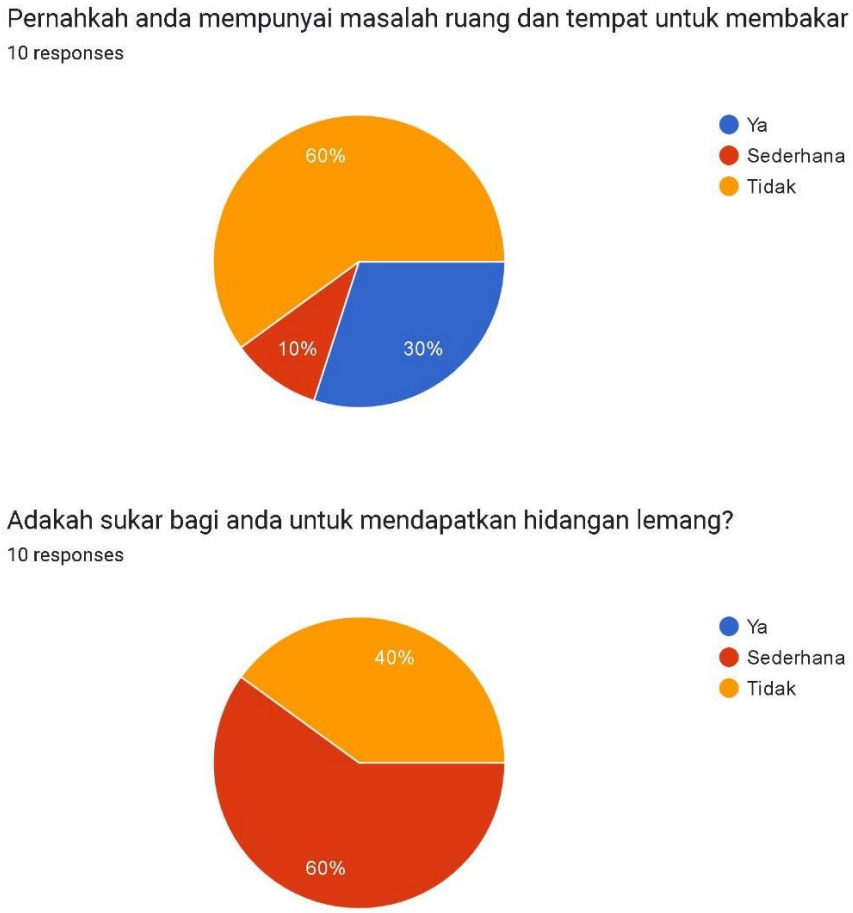


Figure 4.4 : RESULT

4.5 SUMMARY OF CHAPTER

In this chapter it has been explained about the findings and analysis of project results.this can also show the problems that arise and the decisionstest for this Mini Lemang Cokware in addition to its advantages and disadvantages.The steps for using this Mini Lemang Cookware have been explained formake it easy for users to use. In the analysis section has also been explained the type of heat conduction test as well as the time period for cooking lemang. This test has determined that MIni lemang Cookware is able to cook lemang well during the lemang cooking process. This test is included together with the report of the results of the tests.

CHAPTER 5
CONCLUSION & REFERENCE

5.1 Induction

Discussions are made with the aim of raising relevant questionswith the project throughout the production of the project. This is to ensure all working methodscan be carried out and reported in the report book as well as projects that are ready to operatecompletely. This discussion is also conducted from time to time to ensure objectivesfully achieved. Without proper planning, it is possible that the work results result is at a moderate and unsatisfactory level. After discussion andstudy was carried out, then a project was produced which is Mini Lemang Cookware. Deep processdesigning this Mini Lemang Cookware includes several stages. Among the things and issues that are necessarydiscussed is in terms of capital, project quality, survey on usage and an effective way to carry out its manufacture. In addition, daily tasks are arranged for done every month to ensure the production of the project runs smoothly.

5.2 Discussion

This "Mini Lemang Cookware" project has successfully achieved its objective. The objective is Designing innovative products for cooking lemangProduce products that make work easier and reduce the use of manpower and Produce innovative products that can operate with minimal controlIn terms of design, this project is very suitable because its light weight is easy to carry anywhere. In terms of quality, this project reached a satisfactory level because it was made from stainless steel and mild steel. In terms of cooking quality, lemang is also able to be cooked well without losing the original taste of lemang.

5.3 Recommendation for improvement

There are several improvements that can be made to this Mini Lemang Cookware. One of them is to put a timer on this project so that it can set the time until the lemang is cooked. In addition, a buzzer can also be added to this project so that it sounds when the lemang is fully cooked. For now , this is the only improvement we can think of, but for the future this project will continue to be upgraded until it becomes a good project.

Figure 5 Timer

Figure 5.1 Buzer

5.4 Conclusion

In conclusion, this project has a high potential to be marketed. This is because this project received a positive response from the lemang sellers in Malaysia. Although at the initial stage there were various problems, but in the end this project was successfully improved and could be accepted by the public. This kind of project really needs a long period of time to be fully completed. With the cooperation of every team member guided by the project supervisor, this project can be completed successfully.

After various studies and tests that have been carried out on this project, it is proven that Mini Lemang Cookware is a good innovative project for cooking lemang in a modern way. In addition, this project is also proven to be able to produce products that facilitate work and

reduce the use of manpower when cooking lemang. In addition, it is also proven that this project is capable of producing innovative products that can operate with minimal control based on all the data obtained.

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SESSION: 2022/2023