POLITEKNIK MALAYSIA
MUKAH

ELECTRIC SAND SIFTER FOR FOUNDRY

KATHLEEN GELANG ANAK MANGGAT	20DKM14F1016
RICKY LIHAN RUBIN	20DKM14F1007
KASMAN BIN BASRI	20DKM14F1801
GABRIEL ANAK MATHEW SAMBANG	20DKM14F1019
CYNTHIA QUALLARM ANAK JOSEPH	20DKM14F1031

DEPARTMENT OF MECHANICAL ENGINEERING
POLITEKNIK MUKAH

SESSION: DECEMBER 2016

ELECTRIC SAND SIFTER FOR FOUNDRY

NAME	REG. NUMBER
1. KATHLEEN GELANG ANAK MANGGAT	20DKM14F1016
2. RICKY LIHAN RUBIN	20DKM14F1007
3. KASMAN BIN BASRI	20DKM14F1801
4. GABRIEL ANAK MATHEW SAMBANG	20DKM14F1019
5. CYNTHIA QUALLARM ANAK JOSEPH	20DKM14F1031

This report is submitted to the Department of Mechanical Engineering in partial fulfillment of the requirements for graduation Diploma in Mechanical Engineering

PROJECT REPORT VERIFICATION

This report entitled 'Electric Sand Sifter for Foundry' has been submitted and reviewed as to meet the conditions requirements of project writing.

Reviewed by:

SUPERVISOR : MDM DASIMA BINTI SHAHINAN

SIGNATURE :

DASIMA BT SHAHINAN
Pensyarah
Jabatan Kej. Mekanikal
Politeknik Mukah Sarawak

DATE : 3/4/2017

'We attribute this work itself except that each of these accepts we clearly state its source.'

1. Signature : 

   Name : KATHLEEN GELANG ANAK MANGGAT

   Matrix Number : 20DKM14F1016

   Date : 14/3/2017

2. Signature : 

   Name : RICKY LIHAN RUBIN

   Matrix Number : 20DKM14F1007

   Date :14/3/2017

3. Signature : 

   Name : KASMAN BIN BASRI

   Matrix Number : 20DKM14F1801

   Date :14/3/2017

4. Signature : 

   Name : GABRIEL ANAK MATHEW SAMBANG

   Matrix Number : 20DKM14F1019

   Date :14/3/2017

5. Signature : 

   Name : CYNTHIA QUALLARM ANAK JOSEPH

   Matrix Number : 20DKM14F1031

   Date :14/3/2017

ACKNOWLEDGEMENT

We were grateful that we are finally able to complete our tasks in project 1 successfully. Our group would like to take this opportunity to express our appreciation.

First of all, we would like to thank you to our parents who have been supported while we complete the tasks given in this project 1. Our parents who have been very supportive in terms of moral, and encouragement to complete this final project, without their help, would not be able to complete our tasks with perfect especially in terms of financial.

We also want to thanks our group project supervisor Madam DasimaBintiNen@Shahinan who has helped us manage information about our tasks for this semester. In addition, she also has to take responsibilities for monitoring the progress of our tasks from time to time and provide a thoughtful opinion throughout these tasks.

Once again, we would like to thanks the chief supervisor, supervisor and team members who have worked directly or indirectly while our tasks is done completely.

ABSTRACT

The Electric Sand Sifter is the machine to separate greensand from unwanted particles like stones and metal in foundry. The problems statement is we found that PMU's student took a long time to sift the greensand and need more workers at one time. The objectives are to build Electric Sand Sifter that is able to separate greensand and process 50 KG of greensand within 5 minute. We started our project to identifying the problems and collect the information about Electric Sand Sifter and then continued by designing the 3D model using Autodesk Inventor. Then, we list and prepare all the materials for this project. Lastly, we fabricate the project based on the ideas that has been planned. At the end of this project, the Electric Sand Sifter will be unutilized in foundry process for the mechanical students.

ABSTRAK

Pengayak pasir eektrik untuk kegunaan faundri ini adalah mesin untuk memisahkan Greensand daripada zarah yang tidak diingini seperti batu dan logam dalam foundry. Kenyataan masalah ialah kami mendapati bahawa pelajar Politeknik Mukah Sarawak mengambil masa yang lama untuk menapis greensand dan memerlukan lebih ramai pelajar pada satu masa.Matlamat kami adalah untuk membina pengayak pasir elektrik yang mampu memisahkan 50KG greensand dan memproses greensand dalam 1 minit.Kami memulakan projek kami untuk mengenalpasti masalah dan mengumpul maklumat pengayak pasir elektrik dan kemudian terus dengan mereka bentuk model 3D menggunakan Autodesk Inventor.Kemudian, kami menyenaraikan dan menyediakan semua bahan-bahan untuk projek ini.Akhir sekali, kami membina projek ini berdasarkan idea-idea yang telah dirancang.Pada akhir projek ini, pengayak pasir elektrik ini akan digunakan oleh pelajar Semester 2 Jabatan Kejuruteraan Mekanikal.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Introduction

A sieve, or sifter, is a tool for separating from unwanted material or for characterizing the particle size distribution of a sample, typically using a woven screen such as a mesh or net or metal. The word "sift" derives from "sieve".

Sifting technology is practiced on dry sand and soft surfaces. The sand and waste are collected via the pick-up blade of the vehicle onto a vibrating screening belt, which leaves the sand behind. The waste is gathered in a collecting tray which is often situated at the back of the vehicle. Because sand and waste are lifted onto the screening belt, sifters must allow time for the sand to sift through the screen and back onto the beach. The size of the materials removed is governed by the size of the holes in the installed screen.

Combined raking and sifting technology differs from pure sifters in that it uses rotate tines to scoop sand and debris onto a vibrating screen instead of relying simply on the pick-up blade. The tines' position can be adjusted to more effectively guide different-sized materials onto the screen. Once on the screen, combined raking and sifting machines use the same technology as normal sifters to remove unwanted debris from the sand.

Sand sifting by hand is used for smaller areas or sensitive habitat. Sand and debris is collected into a windrow or pile and manually shovelled onto screened sifting trays to separate the debris from the sand. While effective, it requires the movement of sand to the site of the tray, and then redistribution of the sand after sifting. A more efficient method is the use of a screened fork at the place where the debris is located. The effort

to manually agitate the sand can become tiresome. However, a recent development of a battery-powered sand rake combines the spot cleaning.

Sand casting is relatively cheap and sufficiently refractory even for steel foundry use. In addition to the sand, a suitable bonding agent (usually clay) is mixed or occurs with the sand. The mixture is moistened, typically with water, but sometimes with other substances, to develop the strength and plasticity of the clay and to make the aggregate suitable for molding. The sand is typically contained in a system of frames or mold boxes known as a flask.

The mold cavities and gate system are created by compact the sand around models, or patterns, or carved directly into the sand. The sand casting process involves the use of a furnace, metal, pattern, and sand mold. The metal is melted in the furnace and then ladled and poured into the cavity of the sand mold, which is formed by the pattern. The sand mold separates along a parting line and the solidified casting can be removed.

Sand casting is used to produce a wide variety of metal components with complex geometries. These parts can vary greatly in size and weight, ranging from a couple ounces to several tons. Some smaller sand cast parts include components as a gears, pulleys, crankshafts, connecting rods, and propellers. Large application includes housings for large equipment and heavy machine bases. Sand casting is also common in producing automobile components, such as engine blocks, engine manifolds, cylinder heads, and transmission cases.

1.2 Problems Statement

The problem that faced by PMU's Mechanical Students were The Sand Sifter took a long time to sift the sand .Besides, The Sand Sifter needs more workers at one time which explained that old method used more energy.

The current ideas were to solve time problem, manpower and more protection (safety) for students and lecturers. With the Electric Sand Sifter, students or lecturers can manage their times efficiently to finish sifting, they running on the machine with less manpower and more protected (safety) when the machine is running.

1.3 Project Goals

At the end of the project, we will able to build an Electric Sand Sifter for foundry used. We also are able to solve the foundry workshop problem at Polytechnic Mukah Sarawak by replacing the manual sand sifter to Electric Sand Sifter.

1.4 Objectives of the Project

- To build an Electric Sand Sifter for foundry that is able to sieve greensand.

- To build an Electric Sand Sifter for foundry use that can process 50 kg of greensand within 5 minute.

1.5 Scopes of the project- Fulfilling the objectives goals.

• For the scope, we aspect that:-

1. The Electric Sand Sifter is operated with 23 RPM which can sift up to 50KG sand.

2. The mesh sized used in this project is 1mm x 1mm and 6mm x 6mm.

3. The maximum load of sand in the drawer is 160KG for 1 drawer and it needs 2 people to carry the drawer to the Muller.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Creating a casting is one of the oldest manufacturing methods known to humankind and very direct method of producing metal parts. The first castings can be dated back to ancients China is the 4th century B.C. Through the casting process, molten metal is poured into a mold that matches the final dimensions of the finished product. While all metals can be cast, the most predominant are iron, aluminium, steel and copper-base alloys. Castings range in weight from less than an ounce to single parts of weighing several hundred tons.

Over the years, the development of the metal casting industry paralleled the American industrial revolution and foundries developed near growing settlements and cities nationwide. As settler flowed through the American prairie, strongest metals were required to cut through the turf, shoe horses, create buggies and eventually lay the rail tracks that opened the west. Today, cast iron is found in almost all durable goods and machinery. From the machines that make the vehicles we drive and the materials in our homes, we live and travel on cast iron.

2.2 The Importance of the Study/Project

The first documented use of sand filters to purify the water supply dates to 1804, when the owner of a bleacher in Paisley, Scotland, John Gibb, installed an experimental filter, selling his unwanted surplus to the public. This method was refined in the following two decades by engineers working for private water companies, and it culminated in the first treated public water supply in the world, installed by engineer James Simpson for the Chelsea Waterworks Company in London in 1829. This installation provided filtered water for every resident of the area, and the network design was widely copied throughout the United Kingdom in the ensuing decades.

The Sand Sifter or Filter is an ancient ways to isolate the materials. Materials can be as sand, dirt, clay and stone. The effective way to sift any materials is depends on the type of sifter being used. Without a proper system of sifting, it will take a long time to finish the sifting works. This idea of Electric Sand Sifter will save time to complete the work. There is a point where workers will much exposed to injurious health due to inhale the sand during the sand sifting process. With the latest machine, workers can stare and control apart from the machine.

2.3 Sieving and Separating Elements

A sieve or sifter is a device for separating wanted elements from unwanted material or for characterizing the particles size distribution of a sample, typically using a woven screen such as mesh or net or metal. The word 'sift' derives from 'sieve'. Sieving is a simple technique for separating particles of different sizes. A sieve such as used for sifting flour has very small holes. Coarse particles are separated or broken up by grinding against one-another and screen openings. Depending upon the types of particles to be separated, sieves with different types of holes are used. Sieves are also used to separate stones from sand.

In chemistry and chemical engineering, a separation process or a separation technique, or simply a separation is a method to achieve any mass transfer phenomenon that converts a mixture of substances into two or more distinct product mixtures, at least one of which is enriched in one or more of the mixture's constituents. In some cases, a separation may fully divide the mixture into its pure constituents.

2.3.1 Advantages of Electric Sand Sifter

i. Low consumption

ii. Reduce manpower to sifting sand

iii. Reduce time taken to sifting sand

2.3.2 Disadvantages of Electric Sand Sifter

i. High maintenance cost

ii. Material hard to find

iii. Only used for foundry workshop

2.4 The Technology Used

Procedures:

1. Take the green sand from the gunny by using scoop.

2. The sand then put through a sieve to separate it from the stones.

3. Put the sand into a sand mixer and add an amount of water was pour onto the green sand.

4. The amount of water that was poured to the green sand was fixed to a certain ratio to the amount of the green sand.

5. Make sure that the sand are really rough in piece and not easily broken before stop pouring the water into it.

Procedures:

1. Create the mold for the casting by packing sand into each half of the mold.

2. The sand is packed around the pattern or shape of a design.

3. Then remove the pattern so that the cavity that will form the casting remains.

4. Prepared the mold that had been made for the molten metal to be poured.

5. The molten metal is maintained at a set temperature in a furnace.

6. poured certain amount of molten metal to fill the entire cavity and all channel in the mold.

7. Wait for the molten metal to cool and solidify for the final shape of the casting to be formed.

8. After the solidification time has passed, the sand mold can simply be broken, and the casting removed.

9. Trim the excess material from the channels in the mold solidifies that attached to the part by using cutter.

2.5 Case Study- System available on the market

- *Sand Sifter A*

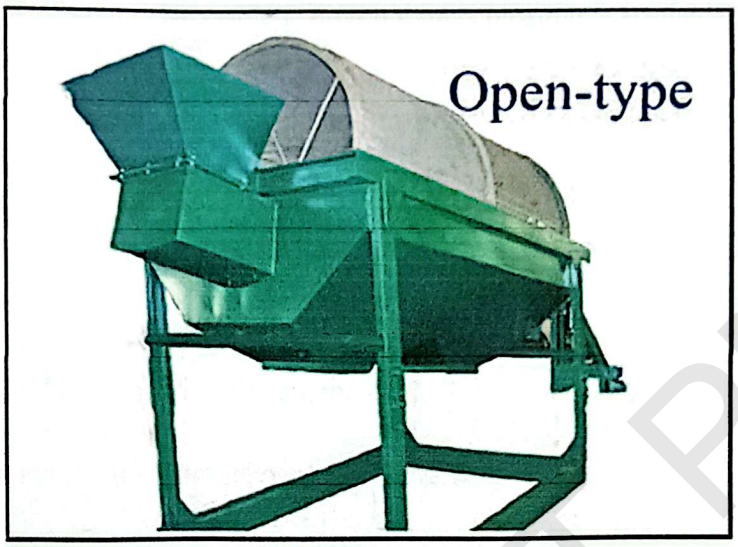


Figure 2.1 Open Type Sand Sifter

Functions:

1. Usually use in Foundry factories.
2. To separate stones from the sand.

Types:

1. Rotating sand sifter
2. Open types
3. Not portable

Sifter shape:

1. Cylinder

Advantages:

1. No limitation when sieving the sand.
2. Low cost of maintenance.

3. Available in different size of sand sifter (size of sifter hole).

4. Easy for cleanliness process.

5. The parts of sand sifter machine does not rusty (coating is available).

6. Automatic sand sifter.

7. Save energy consumption.

Disadvantages :

1. No storage such as drawer or boxes for sand to fall after sieve thus no cleanliness during the process of sieving the sand.

2. Take a long time when sieving the sand (Rotation does not required high speed).

3. Lots of noise is produce when running the machine.

4. High cost in creating the machine.

5. The sifter is fixed (Cannot change the sifter once it is damages).

6. Not portable.

- *Sand Sifter B*

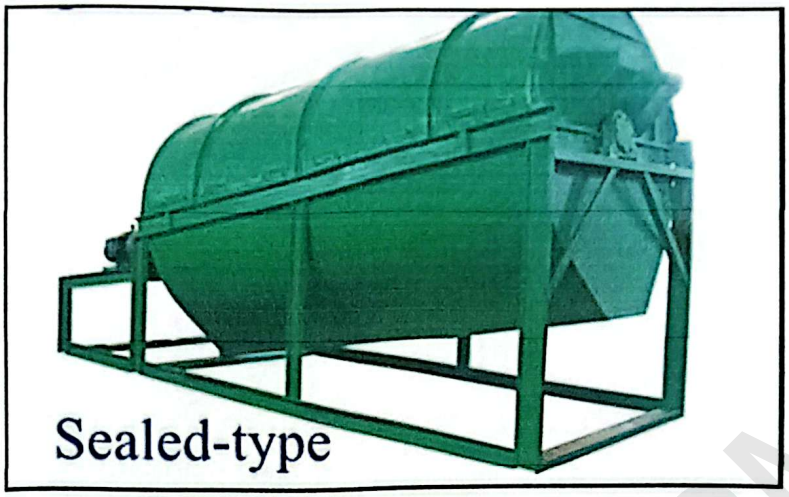


Figure 2.2 Sealed Type Sand Sifter

Functions:

1. Usually in huge size of machine for big industry of Foundry services.
2. Also to sieve the sand from stones.

Types:

1. Rotating sand sifter.
2. Sealed type sand sifter.
3. Not portable.

Sifter shape:

1. Cylinder.

Advantages:

1. Can sieve sand in maximum quantity.
2. Long lasting machine.
3. Does not pollute the environment (sealed).

Disadvantages:

1. Lots of noise is produces.
2. Sifter cannot be change.
3. Not portable.
4. Difficult for cleaning process due to the size of machine.
5. Take a long time when doing the maintenance jobs.
6. Storage boxes are not provided.
7. Required more man energy when close the cover of the sand sifter.

- *Sand Sifter C*

Figure 2.3 Sand Sifters C

Functions:

1. Usually available in mini size.
2. Use to sieve sand in small quantity at certain time.

Types:

1. Vibrating sand sifter.
2. Open type of sand sifter.
3. Not portable.

Sifter shape:

1. Semi-circle.

Advantages:

1. Require high speed so the time taken to sieve the sand is less.
2. Easy to pour the sand inside the sifter since the sifter is open type.
3. Low cost in maintenance the whole parts of machine.
4. Easy for cleanliness process.

Disadvantages:

1. The sand does not fall into storage, which cause the dirt.
2. Lot of noise produces.
3. The sifter is fixed to the stand which cause the maintenance to change/ fix the sifter is difficult.
4. Not portable sand sifter stand.

- *Sand Sifter D*

Figure 2.4 Sand Sifters D

Functions:

1. To sieve sand precisely.
2. Can be used in home for gardening especially.

Types:

1. Open sealed type.
2. Using belting to start the sand sifting process.
3. There is a part where sand is pour into the sand sifter and fall down provided.

Sifter shape:

1. Cylinder

Advantages:

1. Can sieve sand in certain amount.
2. The use of belting can save preparations cost beside than using gear.
3. Low cost of maintenance due to mini size of sand sifter.
4. Can easy to move the sand sifter from one place to other places.
5. People can make their own sand sifter with the same concept since the process of preparation is easy.
6. Does not need high cost of preparations.

Disadvantages:

1. Lots of noise produces when sand sifter is started to sieve.
2. Not portable sand sifter but it is lighter to carry.

CHAPTER 3

METHODOLOGY

3.1 Introduction

From this chapter, we can conclude that our Electric Sand Sifter is built only for foundry used. We have calculated the estimate cost or budget for the electric sand sifter. We also attached the final design and the isometric design.

As we know, the sifter is a device for separating unwanted material or for characterizing size distribution of a sample, typically using a woven screen such as mesh or net or metal. This Electric Sand Sifter will be a practiced in greensand at foundry mechanical workshop at PoliteknikMukah Sarawak.

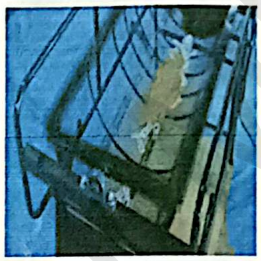
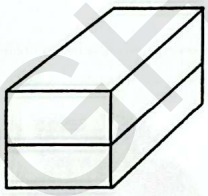
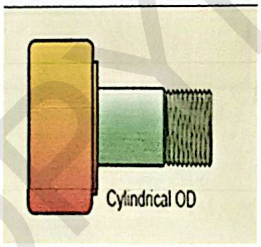
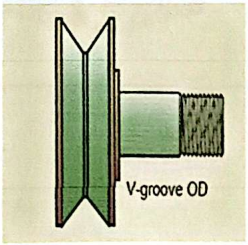
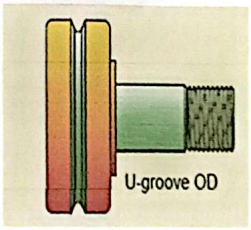
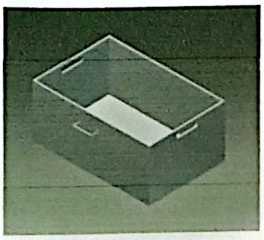
The electric sand sifter will make students or lecturers easier to separate the stones and the greensand as the PoliteknikMukah Sarawak had trouble to sieve the greensand because more students or manpower use in sifting the greensand.

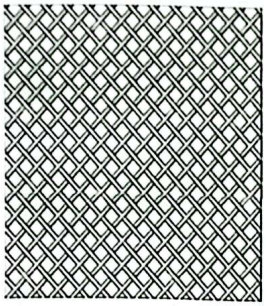
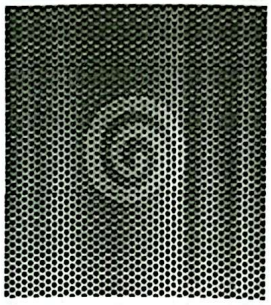
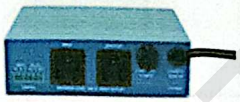
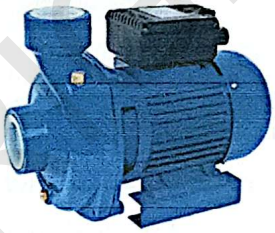
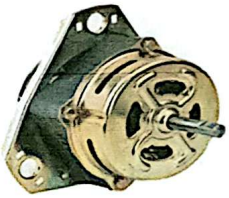
We also had considered the material that we may use to build an electric sand sifter. Some option has been made through the concept generation.

3.2 Development Project

3.2.1 Concept Generation (design concept)

Table 3.1 Concept Generation

CONCEPT	OPTION 1	OPTION 2	OPTION 3
Sand Sifter Shape			
Stand Structure			
Roller			
Drawer			

Mesh Shape			
Power Controller			
Motor			

3.2.2 Numeric Rankings

Table 3.2 Numeric Rankings

Criteria / Option	Weight	Dimension	Costs	Safety	Portable	Clean Up Needed	Attractive Colour
Option 1	**4**	**4**	**3**	**4**	**4**	**4**	**4**
Option 2	**3**	**3**	**2**	**1**	**3**	**4**	**2**
Option 3	**2**	**1**	**1**	**1**	**2**	**4**	**2**

4	3	2	1
BEST			Worst

We have decided to use the option 1 sand sifter shape because it is more suitable for our design. While for the stand structure, we also agree to choose the option 1 also, it is because the option 1 stand structure is suitable for our design and more stable compare to others stand structure. We have agreed to choose the option 1 roller, it is because the type of option 1 roller is suitable for our project and it is fit to the rim size. While for the mesh shape, we also decided to use the option 3 because the mesh shape is easier to find than the others and it is suitable for our project. For the power controller, we decided to choose the option 1 because it is suitable for our design. For the motor, we decided to us the electric motor with 1400 RPM and reduce it to 140 RPM coupling with speed reducer.

3.3 Project Planning

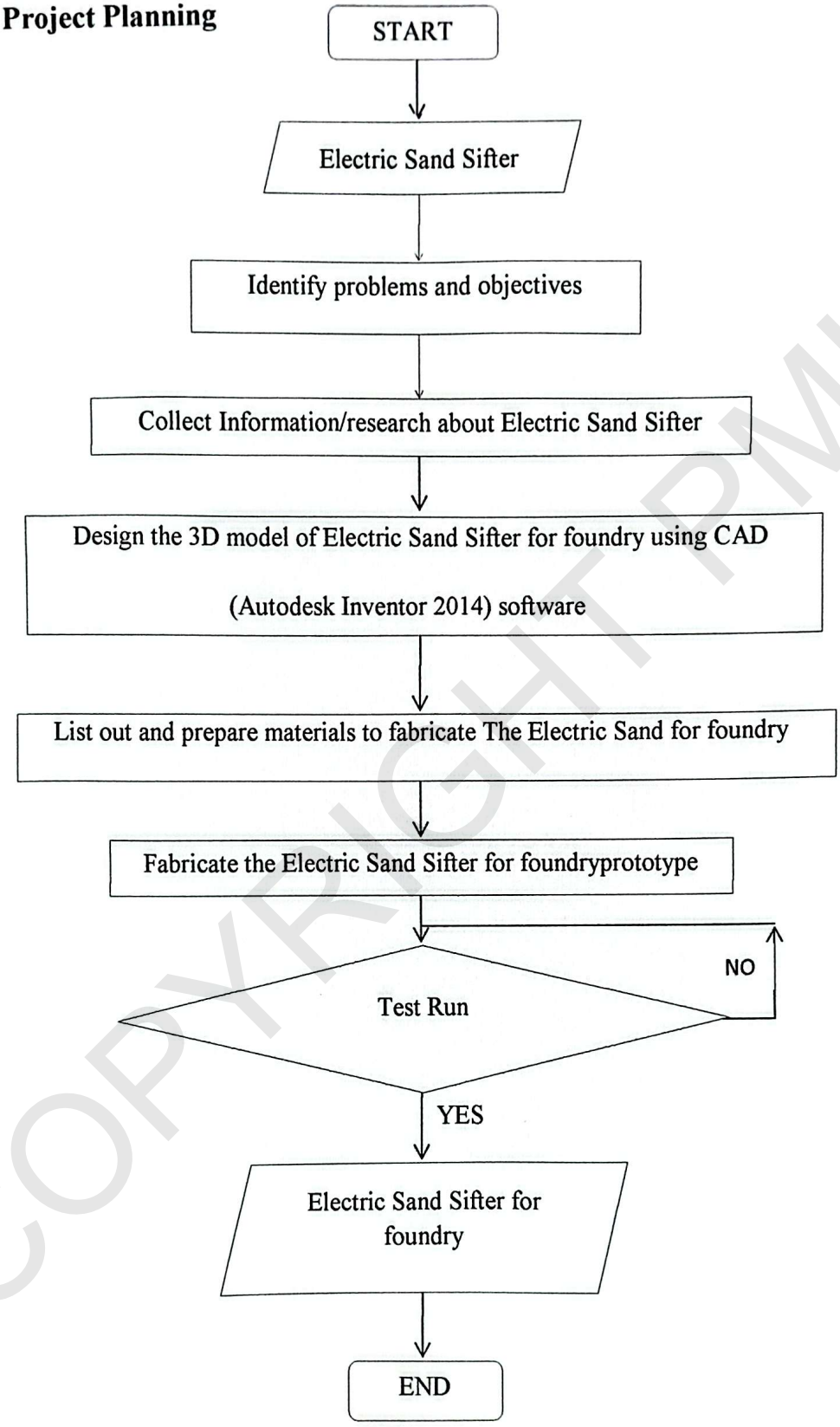


Figure 3.3 Flow Chart

GANNT CHART

POLITEKNIK MALAYSIA

MECHANICAL ENGINEERING DEPARTMENT

GANNT CHART

CODE : DJJ5141

COURSE : PROJECT 1

SEMESTER: JUNE 2016

	JUNE			JULY					AUGUST					SEPTEMBER					OCTOBER						NOV
	REG	W1	W2	W2		W3	W4	W5	W6	W7	W8	W9	W10	W10	W11		W12	W13	W13	W14	W15	W16			
M	13	20	27		4	11	18	25	1	8	15	22	29		5	12	19	26		3	10	17	24	31	
T	14	21	28		5	12	19	26	2	9	16	23	30		6	13	20	27		4	11	18	25		1
W	15	22	29		6	13	20	27	3	10	17	24	31		7	14	21	28		5	12	19	26		2
T	16	23	30		7	14	21	28	4	11	18	25		1	8	15	22	29		6	13	20	27		3
F	17	24		1	8	15	22	29	5	12	19	26		2	9	16	23	30		7	14	21	28		4
S	18	25		2	9	16	23	30	6	13	20	27		3	10	17	24		1	8	15	22	29		5
S	19	26		3	10	17	24	31	7	14	21	28		4	11	18	25		2	9	16	23	30		6

NO	TASKS/ ACTIVITIES
1	Course Registration
2	Project 1 Briefing (M)
	Project Classification (M)
i)	Identify the design or case study
ii)	Select the design or case study
	to be carried out
3	Preparing Proposal (M)
i)	Development of problem
	statement
ii)	Development of objectives
4	LITERATURE REVIEW
i)	Define market strategy studies
ii)	Search information from book,
	jurnal & internet
5	Research Methodology
i)	Identify respondents
ii)	Identify market survey
iii)	Development of design method
iv)	Identify type of product testing
	or analysis
6	Writing Proposal (M)
i)	Draft final Project Design &
	Assembly
ii)	Cost Estimation
iii)	Expected outcome from
	project design
iv)	Estimation of capabilities/
	limitation of project
v)	Development of prototype
7	Final Proposal Presentation
	(M)
i)	Preparing presentation
8	Review Report

CUTI KHAS PERAYAAN

SEMESTER BREAK

FINAL EXAMINATION FOR JUNE SESSION 2016

WEEKS/ PROJECT ACTIVITY	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16
1. Project Fabrication					SPECIAL SEMESTER HOLIDAY				SEMESTER MID BREAK							FINAL EXAM
a. Material Procurement																
b. Creating Body Frame																
c. Remove Rust On The Rim Of A Bicycle																
d. Binding On The Rim Of Bicyle Using Wire																
e. Weld The Wheels On The Frame																
f. Creating A Drawer Project																
g. Drawer Assembly In Body Frame																
h. Belting Installation On A Bicycle Rim And Pulley																
i. Motor Assembly On The Body Frame																
2. Test Run																
a. Data Collection																
3. Data And Analysis																
a. Test Run Data Analysis																
4. Presentation																

NOTE:

: Planning

: Actual

3.4 Project Design

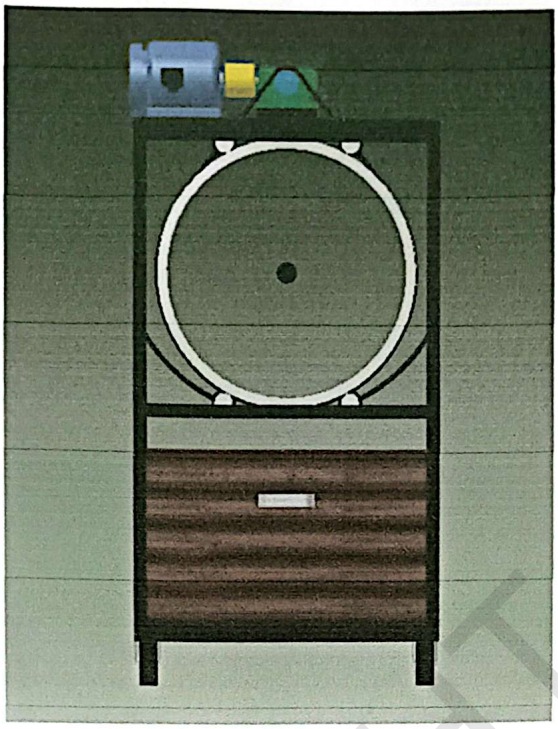


Figure 3.6 Front View

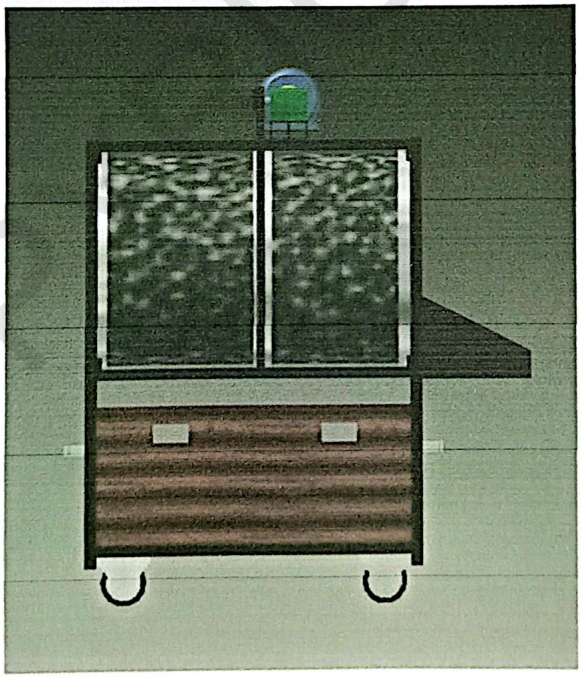


Figure 3.7 Side View

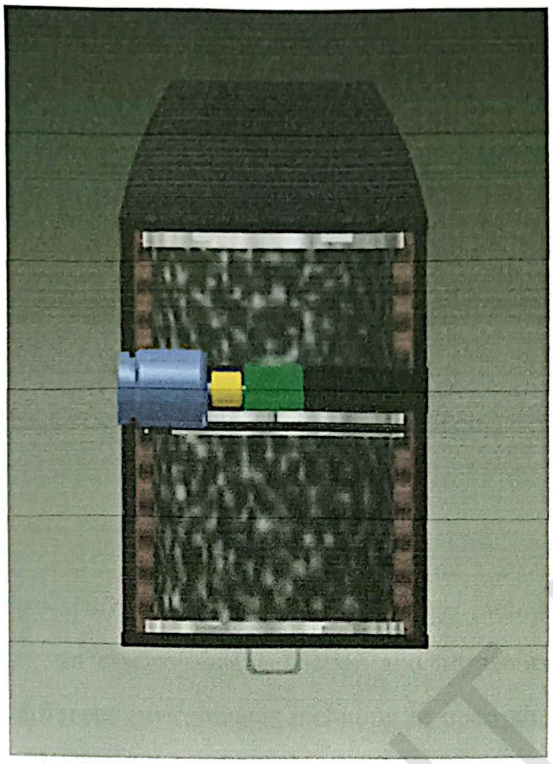


Figure 3.8 Top View

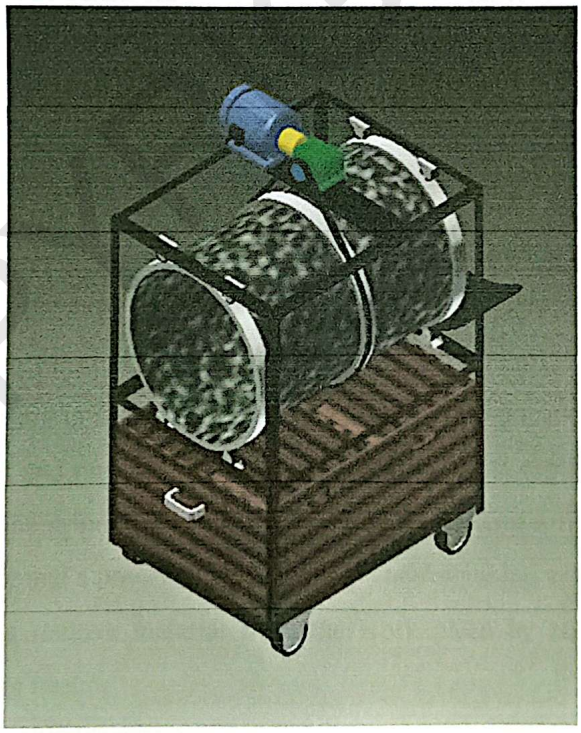


Figure 3.9 Final Design

3.5 Fabrication of machine

3.5.1 Welding

Welding is a fabrication or sculptural process that joins materials usually metals or thermoplastics by causing coalescence. This is often done by melting the work piece and adding a filter material as to form a pool of molten material that cools to become a strong joint with pressure sometimes used in conjunction with heat or by itself to produce the weld. This is contrast with soldering and brazing which involves melting a lower-melting-point material between the work pieces to form a bond between them, without melting the work pieces.

Many different energy sources can be used for welding, including a gas flame, an electric arc, a laser, an electron beam, friction and ultrasound. Welding may be performed in many different environments including in open air, under water and in outer space. Welding is a hazardous undertaking and precautions are required to avoid burns, electric shock, vision damage, and inhalation of poisonous gases and fumes and exposure ultraviolent radiation.

3.5.2 Grinding

Grinding machine is often shortened to grinder is any various power tools or machine tools used for grinding, which is a type of machining using an abrasive wheel as the cutting tool. Each grain of abrasive on the wheel's surface cuts a small chip from the work place via shear deformation.

Grinding is used to finish work piece that must show high surface quality and high accuracy in dimension in shape and dimension. The most applications it tends to be a finishing operation and removes high volumes of metal quite rapidly. Thus, grinding is a driver field. The grinding machine consists of a bed with a fixture to guide and hold the work piece and a power-driven grinding wheel spinning at the required speed. Grinding machines remove material from the work piece by abrasion, which can generate amounts of heat.

3.5.3 Drilling

Drilling is a cutting process that uses a drill bit to cut or enlarge a hole circular cross-section in solid materials. The drill is rotary cutting tool often multipoint. The bit is pressed against the work piece and rotated at rates from hundreds to thousands of revolutions per minute. This forces the cutting edge against the work pieces. Cutting off chips from the hole as it is drilled.

Drills are commonly used in woodworking, metal working, construction and do-it yourself project. Specially designed drills are also used in medicine, space missions and other applications. Drills are available with a wide variety of performance characteristics such as power and capacity.

3.6 Project Development

Project development is the process of fabricating a project from raw material to a specific product. That means the procedures of making Electric Sand Sifter from the design that we choose. The development of this project consists of cutting process, welding process, drilling process and lastly assembling the project.

Firstly, the cutting process for angle bar, we used some apparatus such as Hacksaw, L ruler, chalk and measuring tape. In this process, the first step is measured using measuring tape. Then, marked on the mild steel with referred dimension using chalk and draw the line using L ruler. After that, we start cutting the angle bar that has been marked using chalk. This process is repeated until the last part of design. Make sure use the complete personal protective equipment (PPE) before start the cutting process. When start using the hacksaw, we need to behave our self and make sure the surrounding workplace safe from any hazard.

Figure 3.10 Cutting Process of angle bar

Secondly, for the welding process we used only one type of welding which shielded metal arc welding. The arc welding is only for body frame and base of the motor and speed reducer. Assemble all the part that has been cut to build a body frame and the welding process is started.

Figure 3.11 Arc welding of body frame

Thirdly, the drilling process is started after all part is being welded form the body frame. The drilling process for this project is the body frame.

Figure 3.12 Drilling process of hollow bar

Lastly, paint all the part to make it aesthetically pleasing and to prevent rusting except for the motor and speed reducer. After finish the painting jobs, we assembled all the part starting from the motor and speed reducer, roller, sifter and drawer.

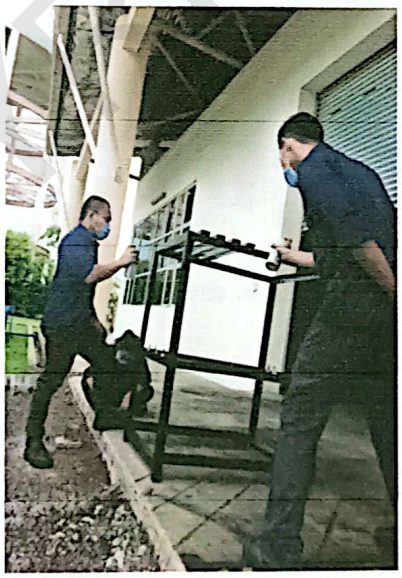


Figure 3.13 Paint Job of body frame

Figure 3.14 Paint Job of bicycle rim

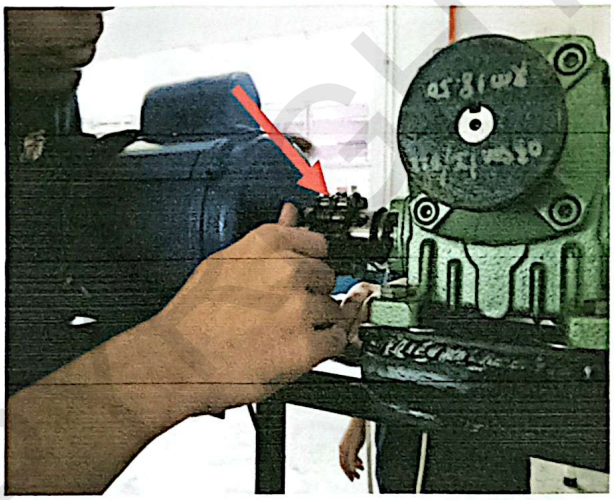


Figure 3.15 Coupling between motor and speed reducer

Figure 3.16 Final Product

3.7 Estimation Budget of Project

Table 3.3 Estimation Budget

NO	MATERIALS	QUANTITY	PRICE
1	Angle bar	4	RM68/6meter
2	Roller	10	RM7.90
3	Sifter/Mesh	1	RM12.90/ 1 meter
4	Metal Plate	1	RM5.00
5	Motor	1	RM350.00
6	Bicycle Rim	3	RM5/1rim
7	Belting	1	RM30.00
8	Power Controller	1	RM30.00
	TOTAL		RM793.90

3.8 Assumptions/Constraints

a) The size or roller width might not suitable for the size of rim.

b) Hard to find the suitable mesh/sand sifter.

c) Hard to find the suitable speed for the motor.

CHAPTER 4

ANALYSIS AND DATA

4.1 Introduction

From the project that has been fabricate, the results bring a lot of benefit to all the students that have been involved in the fabrication of the project. Besides that, the project should have a good safety features so that there is no problems will occurs during the project is conducted. In addition, each of the projects that have been fabricated should undergo test run. This test run is very important in fabricate any projects in order to identify the result whether the project successful fabricate or not.

4.2 The Purpose of Analysis

The test run for this project should be carried out after the completion of fabrication the project. Completed project should fulfil the objectives and scopes that we stated earlier. Any adjustments will be made in terms of its project fabricate that not attained level both in terms of its operations.

The second test run may be done after any modifications made to the project. It is carried out to compare the result before and after modifications. Usually the second test run result gave a better analysis of the projects. The project will be considered as successful if there is no problems and had achieved the project objectives.

Analysis is also necessary to ensure there is no problems occur during the projects operation. Analysis and research can be done after the completion of fabrication projects.

4.3 Conducting Reference

The next step is to make the reference. Reference is done through reading resources, theoretical or via internet. In addition, the opinion of those that experience in the fields of engineering also important to carry out this project.

The fabrication of this project is to fulfil the needs of community in the field of foundry nowadays. After the analysis and study of the project, there are downsides as well benefits on the following project.

4.4 Test Run Analysis

The final product of the project has been completed. The test run had been carried out to our projects. This are the data that had been collected during the test run.

Table 4.1 Test Run Analysis

AMOUNT (KG)	TIME TAKEN	
	MANUAL	MACHINE
10	1 min 18 sec	51 sec
20	2 min 7sec	1min 35 sec
30	4min 37sec	2min 58sec
40	6min 26sec	3min 12sec
50	8min 15sec	4min 36sec

CHAPTER 5

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Introduction

From the previous chapter which is analysis and data of the project and the project analysis detail in relating the achievement of objectives. This is important to know the level of achievement if it could operate the project in accordance with project milestones. With this, it can solve all the problems related to the project.

From all the discussion, we have found a lot of different ideas and we have chosen a brilliant idea on the agreement of all the team members. In addition, the main purpose of the discussion is to get the best result from the test run that we had been carried out. Throughout this discussion, if there are problems, we will return to the process of identifying the problems.

The results will determine either the Electric Sand Sifter for Foundry has reached the objectives. Besides, the cost incurred should also be profitable with the results that have been carried out.

5.2 Identify Problems

During the fabrication process, we had been come with some problems with our Electric Sand Sifter. The problem that we had is we hard to find the suitable one sifter sized for our project. Unfortunately, we also had problem due to our body frame is in the straight position and this cause the particles inside the sifter cannot come out. We also had problem to slow down the motor speed because our motor is in 1400 RPM.

5.3 Problem Solving

Our solutions for the mesh sifter is we using the mesh sized 6mm x 6mm for the first layer and double it with mesh sized 1mm x 1mm. Due to our body frame is in the straight position, we decided to put an hollow bar on the bottom of 2 roller so the body frame will be slanting slightly. For the motor speed, we also had decided to coupling the motor with speed reducer to slow down the speed from 1400 RPM to 140 RPM.

5.4 Costs of Materials

Table 5.1 Costs of materials

NO	MATERIALS	QUANTITIES	PRICE PER UNIT (RM)	TOTAL
1	Angle Bar $1\frac{1}{2}$Inch	3	40.00	120.00
2	Mesh/Sifter	3meter	6.00	18.00
3	Wire	2	1.00	2.00
4	Bosch Metal Disc	1	7.00	7.00
5	WD40 Oil 277ml	3	14.91	44.73
6	63 Undercoat Silver Anchor	1	8.02	8.02
7	Combination Plier 6	1	14.91	14.91
8	Glotool Combination Plier	1	13.96	13.96
9	Red Plastic Handle Brass	1	4.53	4.53
10	Nail	$\frac{1}{2}$KG	2.00	2.00
11	Roller 3 Inch	2	8.00	16.00
12	Handle	2	1.00	2.00
13	Castor Fit Roller(Big)	4	7.90	31.60
14	Plywood (WBP-WG-BBCC) 12mm	1	75.00	75.00
15	Roller 3 Inch	4	8.50	34.00
16	Hollow Bar	1	30.00	30.00
17	Bicycle Rim	3	5.00	15.00
18	0.5 hp x 1400 RPM Motor	1	265.00	265.00
19	1:60 Speed Reducer	1	215.00	215.00
20	Mesh/Sifter	$1\frac{1}{2}$meter	18.00	18.00

21	Bolt Nut	5	0.80	4.00
22	Washer	14	0.30	4.20
23	30 Black Spray	2	8.50	17.00
24	803-Silver	1	8.50	8.50
25	1L KIMTONE 9215	1	24.80	24.80
26	2'H S/BRUSH	2	3.80	7.60
27	Coupling	1	130.00	130.00
28	3'B1 Pulley	1	70.00	70.00
29	Mesh Sifter (1mm x 1mm)	$2\frac{1}{2}$meter	35.00	35.00
	TOTAL			**RM1237.85**

5.5 Conclusion

As a result of the fabrication of the project, we had been successfully built the Electric Sand Sifter for Foundry Used. From all the analysis that we had been carried out, the Electric Sand Sifter for Foundry Used can running smoothly and can be used to sieve the greensand for foundry used.

In general, the project has achieved the objectives of this project to sieve the greensand for foundry purpose. This Electric Sand Sifter for Foundry Used can be an alternative to the sifter at the foundry workshop. This Electric Sand Sifter for Foundry Used can sieve 50KG greensand within 3 minutes.

As a summary, we are able to design and fabricate Electric Sand Sifter for foundry used for this project. This Electric Sand Sifter for foundry used is able to help semester 2 mechanical students to sieve the greensand during foundry workshop. Besides, this machine will help them to reduce the time taken for sieving greensand. We believe this machine provide easy ways to make students sieve the greensand and this machine are portable. Our objectives of this project are achieved.

5.6 Recommendation

In fabricate Electric Sand Sifter; every new invention must have been shortcomings and weakness. Shortcomings and weaknesses can be solved by doing the discussion between the group members. Several suggestions have been made for submission to

the Polytechnic of the project description. This is the recommendation that had been making:

i. Materials used for the body frame can be change to the material that is lighter.

ii. Using the more high speed electric motor, so that speed reducer can reduce the speed up to 150 RPM.

iii. The mesh sifter can be changed to the mesh sifter that is more hard materials.

REFERENCES

1. "Sand-sifter." U.S Patent 1,354,319, issued September 28, 1920.
2. Koshal, D. (2014). Manufacturing engineer's reference book. Butterworth-Heinemann.
3. Zanetti, M. C., & Fiore, S. (2003). Foundry processes: the recovery of green moulding sands for core operations. Resources, Conservation and Recycling, 38(3), 243-254.
4. Maeedda, Y., Maruoka, Y., Makino, H., & Nomura, H. (2003). Squeeze molding simulation using the distinct element method considering green sand properties. Journal of materials processing technology, 153(2), 172-178.
5. Nicholls, M.B. (1946). U.S Patent No. 2,395,138. Washington, DC: U.S Patent and Trademark Office.
6. Cipriano, G. (1928). U.S Patent No. 1,675,092. Washington, DC: U.S and Trademark Office.
7. Kaufman, J. G., &Rooy, E. L. (2004). Aluminum alloy castings: properties, processes, and applications. Asm International.
8. Zanetti, M.C., & Fiore, S. (2003). Foundry processes: the recovery of green moulding sands for core operations. Resources, Conservation and Recycling, 38(3), 243-254.`
9. Dalquist, S., &Gutowski, T. (2004, January). Life cycle analysis of conventional manufacturing techniques: sand casting. In ASME 2004 International Mechanical Engineering Congress Exposition (pp. 631-641). American Society of Mechanical Engineers.

APPENDIXES

FIGURE 4.1

FIGURE 4.2

FIGURE 4.3

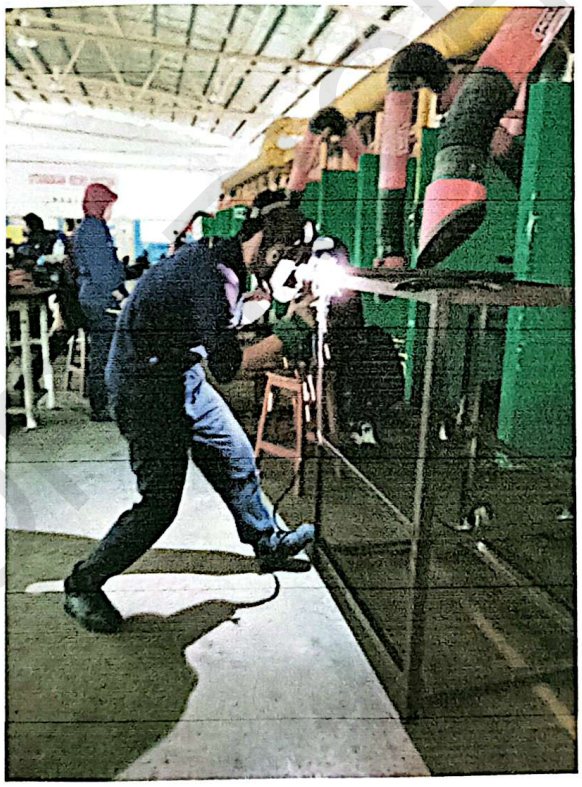


FIGURE 4.4

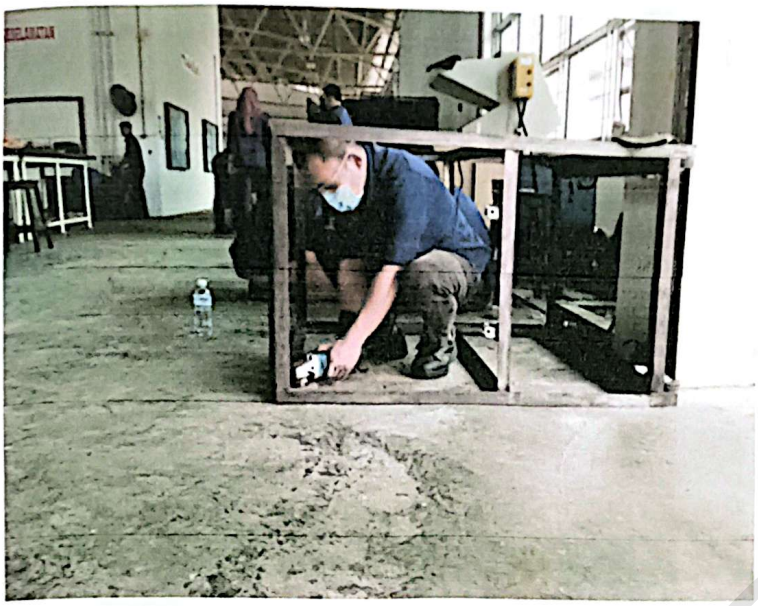


FIGURE 4.5

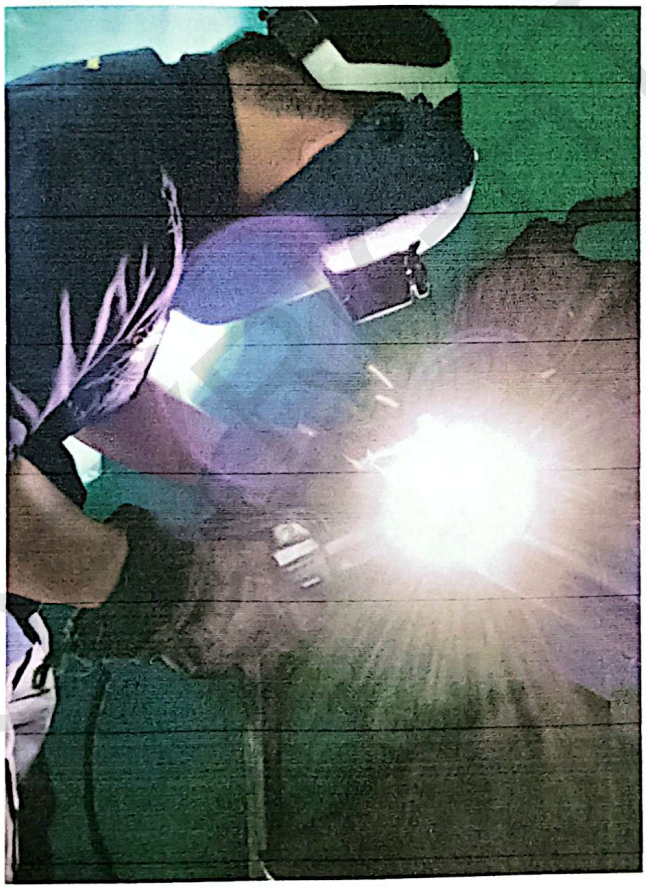


FIGURE 4.6

FIGURE 4.7

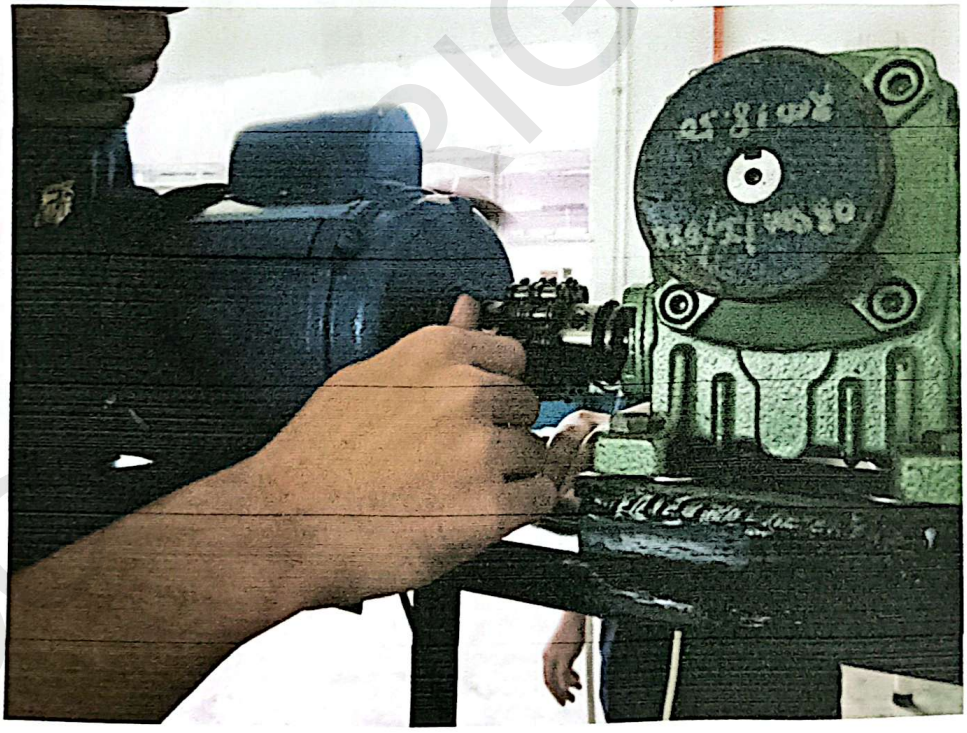


FIGURE 4.8

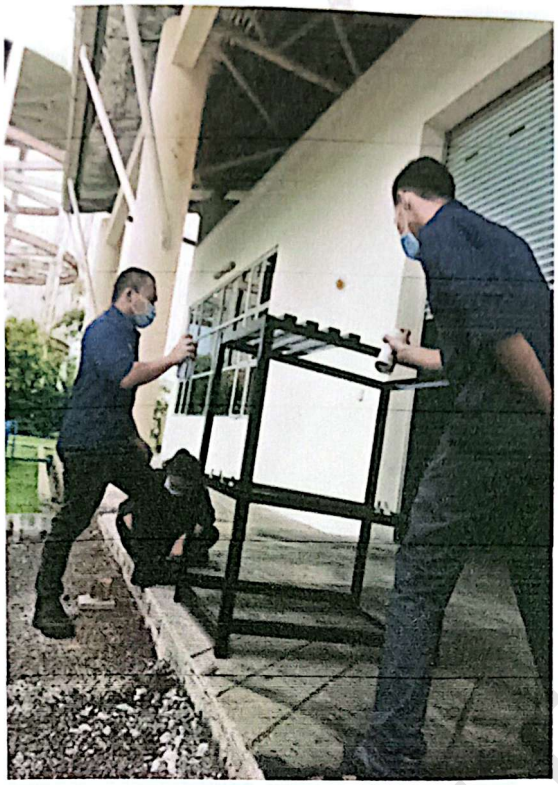


FIGURE 4.9

FIGURE 4.10