Design and Construction of Belt Type Oil Skimmer

Submitted by

Abubakar Siddique	ID: BME-1903019428
Md. Saiful Islam	ID: BME-1903019020
Md. Manirul Islam Howlader	ID: BME-1903019269
Md. Shohan	ID: BME-1903019036
Avijit Bepari	ID: BME-1903019271

Supervised by

Ahtasamul Haque Khan Shuvo

Assistant Professor

SUBMITTED TO THE:

Department of Mechanical Engineering

SONARGAON UNIVERSITY (SU)

In partial fulfillment of the requirement for award of the degree

Of

Bachelor of Science in Mechanical Engineering

Dhaka, Bangladesh.

23- May -2023

LETTER OF TRANSMITTAL

May, 2023

To

Ahtasamul Haque Khan Shuvo
Assistant Professor.
Department of Mechanical Engineering.
Sonargaon University

Subject: Submission of Project Report**.**

Dear Sir,

We are pleased to submit the project report on "**Belt Type Oil Skimmer".** It was a great pleasure to work on such an important topic. This project has been done as per instruction of your supervision and according to the requirements of the Sonargaon University.

We expect that the project will be accepted by the concerned authority we will remain happy to further explanation that you may feel necessary in this regard.

Thank You
Sincerely yours,

Abubakar Siddique
BME-1903019428

Md. Saiful Islam
BME-1903019020

Md. Manirul Islam Howlader
BME-1903019269

Md. Shohan
BME-1903019036

Avijit Bepari
BME-1903019271

DECLARATION

We do hereby solemnly declare that, the work presented here in this project report has been carried out by us and has not been previously submitted to any University/ Organization for award of any degree or certificate

We hereby ensure that the works that has been prevented here does not breach any existing copyright.

We further undertake to indemnify the university against any loss or damage arising from breach of the foregoing obligation.

Abubakar Siddique
BME-1903019428

Md. Saiful Islam
BME-1903019020

Md. Manirul Islam Howlader
BME-1903019269

Md. Shohan
BME-1903019036

Avijit Bepari
BME-1903019271

ACKNOWLEDGEMENT

First, we started in the name of almighty Allah. This thesis is accomplished under the supervision of **Ahtasamul Haque Khan Shuvo,** Assistant Professor, Department of Mechanical, Sonargaon University. It is a great pleasure to acknowledge our profound gratitude and respect to our supervisor for this consistent guidance, encouragement, helpful suggestion, constructive criticism and endless patience through the progress of this work. The successful completion of this thesis would not have been possible without his persistent motivation and continuous guidance.

The authors are also grateful to **Md. Mostofa Hossain,** Head of the Department of Mechanical Engineering and all respect teachers of the Mechanical Engineering Department for their co-operation and significant help for completing the thesis work successfully.

ABSTARCT

Nowadays there are lots of oil accidents happening in the ocean and it makes huge impact on environment. Due to Sea accidents can further cause oil pollution. So the oil separator systems are necessary in such cases. Various oil separator systems are available currently all over. In oil separator systems belt is one of the most important components. Different types of belts are been in use in these systems. Performance and efficiency of these systems mainly depends on the type of belt & belt material use in the system. This belt speed will be able to control its speed. So, it is necessary to study and analyze the performance of various types of belts in order to select proper belt for better performance. In this paper we are taking a review of various types of belt materials used, research work done on oil skimmers and their belt materials. In this project we use a transformer, gear motor, Pulley, bearing, conveyor belt, and many things. The main purpose if this system is separate oil from water with a conveyor belt.

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER 1
INTRODUCTION

1.1 General

The basic objective of this project work is to develop oil skimmer. Oil is one of the most important energy draw material sources for synthetic polymer and chemicals worldwide. As long as oil is explored, transported, stored and used their will ether risk of spillage. Oil pollution, particularly of sea and navigable water, has exited more public concerned than other water or spilt materials. Oil pollution of the sea has steadily increased with the increase in oil consumption. The bulk this in flux is due to transportation related activities spill from tanker loading and unloading operations, pipeline rupture which may be due to industrial waste as leakage from engines, incorrect operations of valves and discharge of oily wastages. Oil pollution of the shore in addition to the reduction of amenity, also affects marine, shore life and vegetation. Crude oil consists of different hydrocarbon that range from light gas to heavy solids. When oil is spilled on water, the physical and chemical properties of oil change progressively. Spilled oil has an undesirable taste and odor and causes severe environment damage on water fall, material life and affects tourism economy. The pollution increasing various sectors of the world.

Oil is one of the precious crudes and being used in many routine applications of human life. Since most of the oils are toxic so quite dangerous for alive when it comes to direct contact with them. During the years of recent decades, world has witnessed many oil spillage tragedies and subsequent damage to alive and environments. Many countries has made stringent safety norms for waste water disposal contained with oils mainly typically from petrochemical and process industries so that such industries are equipped with such kind of oil skimmers to separate the oils from disposal water.

1.2 Objectives of the project was

We have some specific objectives for this project and they are pointed below:

- Design And Construct of a **Belt Type Oil Skimmer.**
- To implement and study of **Belt Type Oil Skimmer**.
- To take necessary notes from the project for future improvements.

1.3 Scopes of use

- In reduce oil wastage.
- Just set the system and the system will different oil from water accurately.

1.4 Structure of the Project

This Project is organized as follows:

Chapter 1 Introduction**:** The first chapter contains the statement of the introduction, our background study for the project, problem statement, objectives of the study and the project outline.

Chapter 2 Literature Review**:** The chapter two contains our introduction, literature review part.

Chapter 3 Hardware and Software Analysis**:** Chapter three describes the theoretical model. Here we mainly discuss about proposed system Hardware and software development of our project etc.

Chapter 3 Methodology**:** Chapter three describes the theoretical model. Here we mainly discuss about proposed system architecture in details with having block diagram, circuit diagram, structural diagram, project working principle, complete project image etc.

Chapter 4 Result and Discussion**:** Chapter four deals with the result and discussion and discuss about our project advantages and application.

Chapter 5 Conclusion**:** Chapter five all about our project conclusion and future scope.

CHAPTER 2
LITERATURE REVIEW

2.1 Related Research/ Works

A M Najar and et al [1] ; It is now common practice to use disc skimming systems to recover oil floating on the surface of water. However, the performance of these devices is dependent on a large number of parameters and is certainly not understood completely. This paper describes a fundamental study in which experimental techniques have been developed to enable the performance of model skimmers to be measured.[1] This has enabled the importance of the various parameters to be examined in a more systematic and detailed way than ever before. Based upon an improved understanding of the flow behavior inherent in the oil collection process, a number of enhanced disc skimming systems are discussed. Results are presented for these systems to show the capabilities of the new forms of disc skimmer when operated as oil recovery devices [2].

A H Hammoud et al [2]; Oil spill recovery by means of a rotating drum skimmer was investigated experimentally for a wide range of design and operating conditions. The effect of drum diameter, drum length, rotating speed, oil lm thickness, oil properties, and drum center height above the oil/water interface surface were analyzed with respect to oil recovery rate of the drum skimmer. Crude, diesel, SAE 10W and SAE 140W oils were used during this investigation. It was found that oil recovery rate increases with increasing drum diameter, drum length, drum center height above the oil/water interface, and oil slick thickness oil viscosity, and increases as oil density and surface tension decreases. The results revealed that the drum skimmer is an effective device for recovering spills of low viscosity oil, such as light crude oil, which is the type of oil involved in most serious spills and pollutions of the sea. Furthermore, an empirical equation is proposed for predicting the oil recovery rate of the device. The equation can be applied to different oils, and gives good agreement with observed data [3].

Suraj Nair et al; [3] Recently in Mumbai, there occurred 2 cases of sever oil spill near sea shore affecting most of the aquatic life of the area. Also fishing and tourism were affected by this spillage. The environmental effects of such oil spills are not negligible as this is a global problem now days. Every year, there is 100 million US gallons of oil spill. This is

equal to 100 large size gymnasium halls. The numbers though could not tell the actual harm caused to the environment by such oil spill as it is in numerous. So there is need of an effective way to clean this oil from the surface without actually wasting it. Now, in industries, to separate oil from other things like coolant and water, we use oil skimmers. There are various methods for this, of which disk type oil skimmer is one of the majorly used [3].

Tushar Pathare et al [4]; Aim of this project is to remove the oily effluent from the waste water. Pollution has created lot of problems in industries. By removing the oil from waste water, it becomes free of oil pollutions. Oil skimmers are commonly found in three types: weir, oleophilic and non-oleophilic. Oleophilic skimmers are distinguished not by their operation but by the component used to collect the oil (rope, disk, belt or drum). It can remove even a thin floating film of oil from the water. This is mainly due to the "oleophilic material" used in the belt. A free floating endless belt oil skimmer was developed as means of recovering spilled oil from surface water. The skimmer utilizes a unique high efficiency belt which is driven by motor. By removing oil we can preprocess water for other use. This can avoid water wastage and control pollution due to oil spillage. In current world scenario most of the oil from the industries goes wasted into ponds, rivers and sea. So, national and international environmental norms are getting strict day by day. It is economical to manufacture a low-cost machine to meet these norms [4].

Suraj Burungale et al [5]; Aim of this project is to remove the oily effluent from waste water of sugar factory. A free-floating endless belt oil skimmer was developed as means of recovering spilled oil from surface water. The skimmer utilizes a unique high efficiency belt which is driven by motor. By removing oil, we can preprocess water for other use. A free-floating endless belt oil skimmer was developed as means of recovering spilled oil from surface water. The skimmer utilizes a unique high efficiency belt which is driven by motor. By removing oil, we can preprocess water for other use. [5]

Philip C. Lewan et al [1992] [6] had studied apparatus for removing oil from the surface of a liquid using an endless belt partially submerged in the liquid, the belt passes over a primary roller having a vertical axis and pressure rollers squeeze the belt on the primary roller removing oil from the belt which allows by gravity to a collection receptacle mounted upon a frame supporting the primary roller and its drive structure. The belt twists whereby

its lower portion submerged in the liquid denes a reversing loop whose configurations maintained by a weight roller having a horizontal axis of rotation.

Mamta Patel [2015] [7] had studied the function of oil skimmer, its various design aspects and performance. All the results of experimental studies indicate that slight design improvement of typical oil skimmers towards to include additional belt shaft and use of belt with steel material instead of rope; significantly improve the oil recovery efficiency and also its structure became simpler. As practical overview of different oil spillage cleanup method, this paper has illustrated several limitations of these methods and current oil spill technology. Further extensive research & testing can improve the existing techniques and equipment to have better control for oil recovery exercise.

Prof. P.A. Patil et al [2017] [8] had concluded that the separation of oil is based on surface tension, specific gravity and viscosity. He studied the operation of oil skimmer on various positions of the belt like inclined, vertical, horizontal. Spills may occur from refined petroleum products. Off and on from there by products, and heavier fuels used by large water vessels such as bunker fuel, or the spill of any oily refuse or waste oil. Cleaning and full recovery of spilled oil is challenging and may takes weeks or months. Sometimes even years required to clean up.

2.2 Summary

The above has been discussed in detail in the past few literatures which has given us a lot of motivation to do this project.

CHAPTER 3
HARDWARE AND SOFTWARE ANALYSIS

In this section, we will discuss elaborately about our hardware design of "**Belt Type Oil Skimmer**" and the component description, features, working procedure and description of our all equipment.

Software

- Proteus 8.9

Hardware

- Transformer
- Gear Motor
- Pulley
- Bearing
- Conveyor Belt
- Wire
- Switch

3.2 Transformer:

A transformer is an electrical device used to change the value of an alternating voltage. Transformers are widely used in electrical work. They are encountered daily, in industrial, commercial and domestic situations. They vary in size from miniature units used in electronics to huge units used in power stations. The efficient transmission and distribution of electricity throughout the country would be impossible without the use of power transformers.

Transformers are also used for safety reasons on construction sites when using power tools and in domestic bathroom situations in shaver units. They are used in doorbell operation and also

to power electronic equipment, battery chargers, televisions, computers, alarm systems, etc. Transformers vary considerably in construction, size and shape depending on their application.

All transformers rely on the principle of mutual inductance for their operation. Mutual inductance was discussed in detail in Unit Magnetism, Electromagnetism and Electromagnetic Induction.

Transformer Symbols:

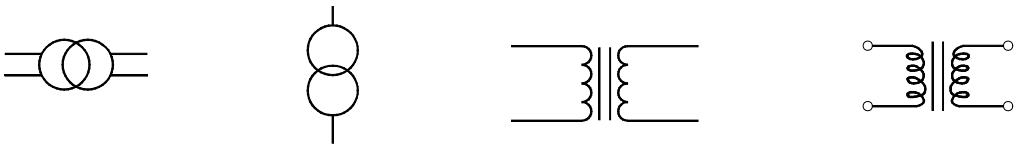

Figure 3.1: Transformer Symbols

Transformer Construction:

A transformer consists of two coils of wire called windings, which are wound onto a common iron core. The wire used in the two windings, primary and secondary, is coated with an insulating varnish. Both coils are wound onto, but insulated from the iron core.

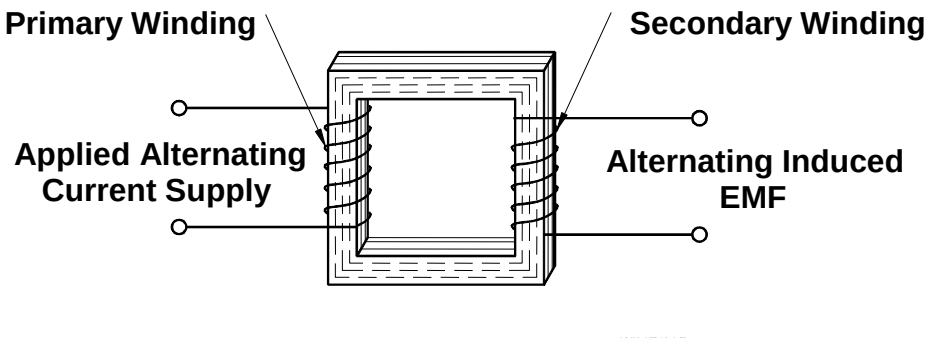

Figure 3.2: Transformer Construction.

The Transformer Principle:

When a conductor or coil is moved in a stationary magnetic field it cuts the lines of magnetic flux and an EMF is induced in the conductor or coil. This same principle also applies when a conductor is held stationary and the magnetic flux is made to change or vary.

Now consider an alternating current applied to a stationary coil. A magnetic field will build up and collapse in the coil, continually rising and falling in harmony with the applied AC current as shown in Figure

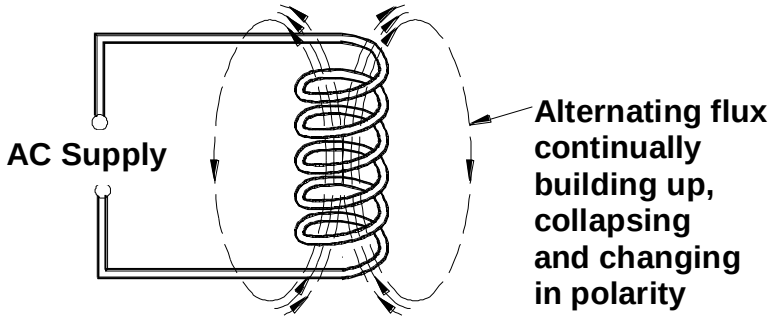

Figure 3.3: Transformer Primary Coil.

If a second coil (coil 2) is placed close to the first coil (coil 1) the alternating magnetic flux in coil 1 links with coil 2. This results in an EMF being induced in coil 2. This is a process known as **mutual induction**.

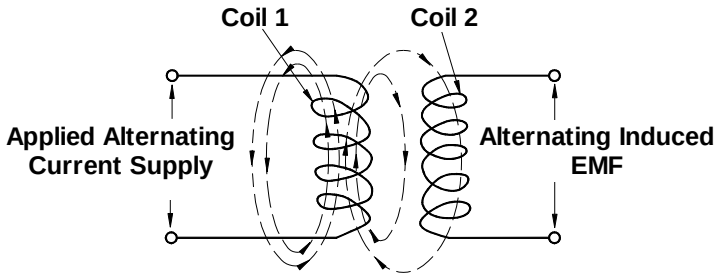

Figure 3.4: Transformer Primary & secondary Coil.

If coil 1 and coil 2 are mounted on an iron core the magnetic flux around both coils will be concentrated. This arrangement of coils and an iron core form the complete device known as a **transformer**.

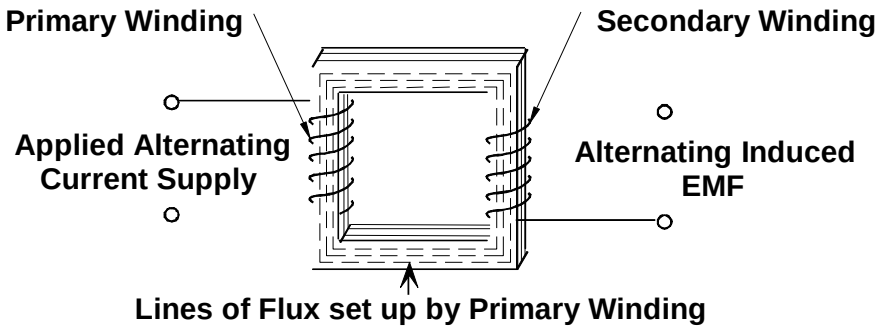

Figure 3.5: Lines of Flux set up by primary Winding

The input coil of a transformer is fed from the AC supply and is called the **primary winding**. The output coil, to which the load is connected, is called the **secondary winding**. It is important to remember that there is no electrical connection between the primary winding and the secondary winding of a transformer. The only common link between the two windings is the magnetic field.

3.3 The Full Wave Rectifier:

The first building block in the dc power supply is the full wave rectifier. The purpose of the full wave rectifier (FWR) is to create a rectified ac output from a sinusoidal ac input signal. It does this by using the nonlinear conductivity characteristics of diodes to direct the path of the current.

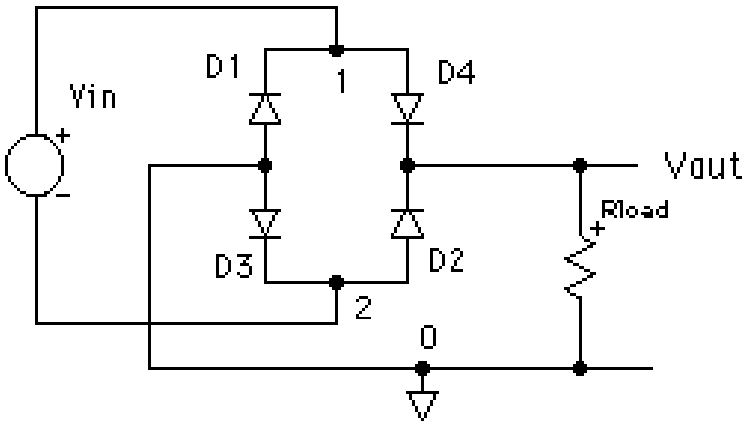

Figure 3.6: Common four-diode bridge configuration for the FWR.

Filtered Full Wave Rectifier

The filtered full wave rectifier is created from the FWR by adding a capacitor across the output.

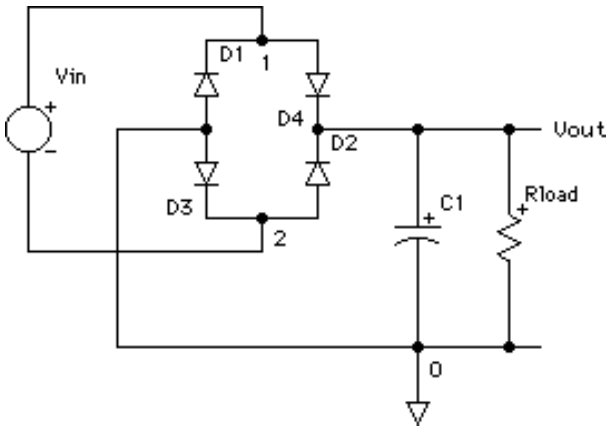

Figure 3.7: Filtered full wave rectifier

The result of the addition of a capacitor is a smoothing of the FWR output. The output is now a pulsating dc, with a peak-to-peak variation called ripple. The magnitude of the ripple depends on the input voltage magnitude and frequency, the filter capacitance, and the load resistance.

To describe the source of the voltage ripple, consider the performance of the filtered full wave rectifier above. The input to the rectifier is a sine wave of frequency f. Let Vi be the full wave rectified signal input to the filter stage of the rectifier and Vo be the output. Vi can be approximated as the absolute value of the rectifier input, with frequency 2f.

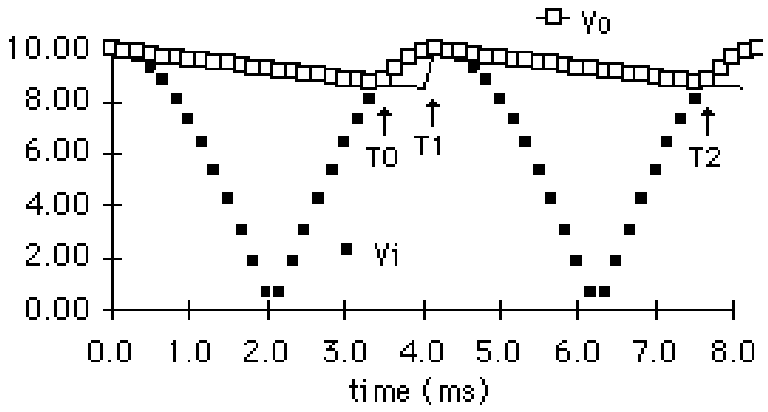

Figure 3.8: Output (Vi) and input (Vo) of a filtered full wave rectifier

In the time period from T0 to T1, the diode D1 (or D3, depending on the phase of the signal) is forward biased since Vi > VC1 (approximate the forward biased diode as a short circuit). The capacitor C1 charges and the voltage across the load R increases. From T1 to T2, the diodes D1 and D2 are reverse biased (open circuit) because Vcap > Vi, and the capacitor discharges through the load R with a time constant of RC seconds.

3.4 Transistor:

BC 547 NPN transistor Specifications:

BIPOLAR TRANSISTOR, NPN, 45V, TO-92

- Transistor Polarity: NPN
- Collector Emitter Voltage V(br)ceo: 45V
- Transition Frequency Type ft: 300MHz
- Power Dissipation Pd: 625mW
- DC Collector Current: 100mA
- DC Current Gain HFE: 150

The invention of the bipolar transistor in 1948 ushered in a revolution in electronics. Technical feats previously requiring relatively large, mechanically fragile, power-hungry vacuum tubes were suddenly achievable with tiny, mechanically rugged, power-thrifty specks of crystalline silicon. This revolution made possible the design and manufacture of lightweight, inexpensive electronic devices that we now take for granted. Understanding how transistors function is of paramount importance to anyone interested in understanding modern electronics.

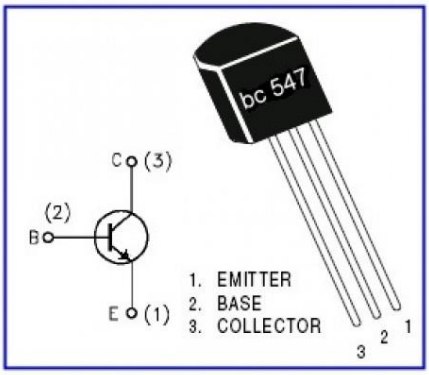

Figure 3.9: Transistor BC 547.

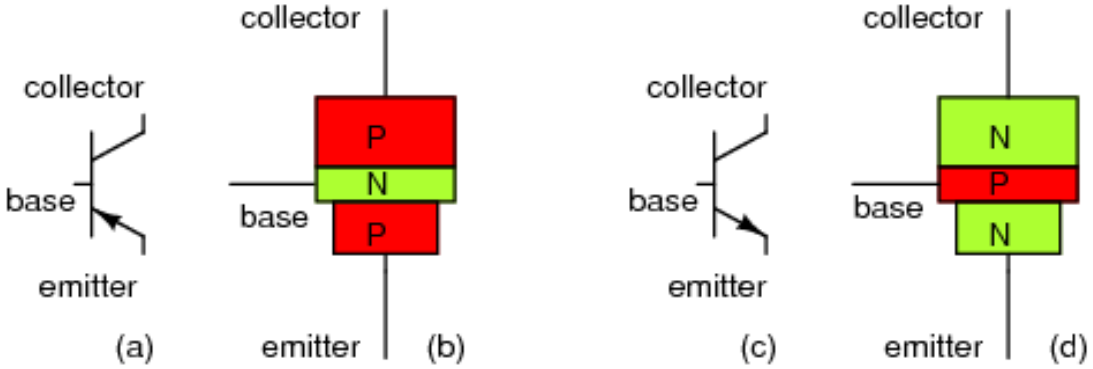

Figure 3.10: Transistor Symbol.

My intent here is to focus as exclusively as possible on the practical function and application of bipolar transistors, rather than to explore the quantum world of semiconductor theory. Discussions of holes and electrons are better left to another chapter in my opinion. Here I want to explore how to use these components, not analyze their intimate internal details. I don't mean to downplay the importance of understanding

semiconductor physics, but sometimes an intense focus on solid-state physics detracts from understanding these devices' functions on a component level. In taking this approach, however, I assume that the reader possesses a certain minimum knowledge of semiconductors: the difference between "P" and "N" doped semiconductors, the functional characteristics of a PN (diode) junction, and the meanings of the terms "reverse biased" and "forward biased." If these concepts are unclear to you, it is best to refer to earlier chapters in this book before proceeding with this one.

A bipolar transistor consists of a three-layer "sandwich" of doped (extrinsic) semiconductor materials, either P-N-P in Figure below a(b) or N-P-N at (d). Each layer forming the transistor has a specific name, and each layer is provided with a wire contact for connection to a circuit.

BJT transistor:

(a) PNP schematic symbol,
(b) physical layout
(c) NPN symbol,
(d) layout.

The functional difference between a PNP transistor and an NPN transistor is the proper biasing (polarity) of the junctions when operating. For any given state of operation, the current directions and voltage polarities for each kind of transistor are exactly opposite each other.

Bipolar transistors work as current-controlled current regulators. In other words, transistors restrict the amount of current passed according to a smaller, controlling current. The main current that is controlled goes from collector to emitter, or from emitter to collector, depending on the type of transistor it is (PNP or NPN, respectively). The small current that controls the main current goes from base to emitter, or from emitter to base, once again depending on the kind of transistor it is (PNP or NPN, respectively). According to the standards of semiconductor symbology, the arrow always points against the direction of electron flow. (Figure below)

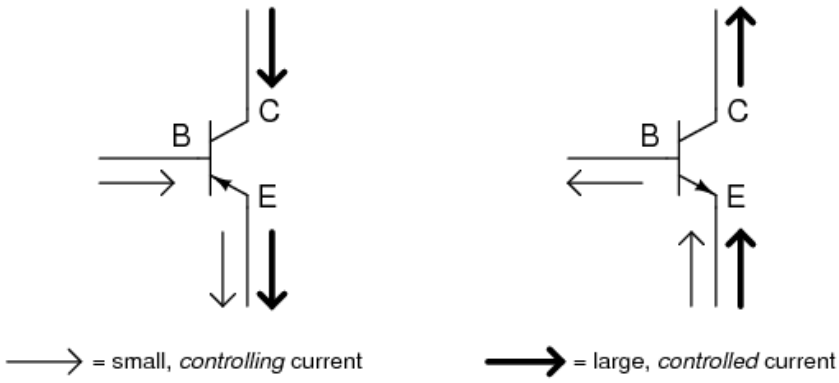

Figure: 3.11 NPN & PNP Transistor Symbol.

Small Base-Emitter current controls large Collector-Emitter current flowing against emitter arrow. Bipolar transistors are called bipolar because the main flow of electrons through them takes place in two types of semiconductor material: P and N, as the main current go from emitter to collector (or vice versa). In other words, two types of charge carriers—electrons and holes—comprise this main current through the transistor.

As you can see, the controlling current and the controlled current always mesh together through the emitter wire, and their electrons always flow against the direction of the transistor's arrow. This is the first and foremost rule in the use of transistors: all currents must be going in the proper directions for the device to work as a current regulator. The small, controlling current is usually referred to simply as the base current because it is the only current that goes through the base wire of the transistor. Conversely, the large, controlled current is referred to as the collector current because it is the only current that goes through the collector wire. The emitter current is the sum of the base and collector currents, in compliance with Kirchhoff's Current Law.No current through the base of the transistor, shuts it off like an open switch and prevents current through the collector. A base current, turns the transistor on like a closed switch and allows a proportional amount of current through the collector. Collector current is primarily limited by the base current, regardless of the amount of voltage available to push it.

3.5 DC Gear Motor

Description:

A DC motor is any motor within a class of electrical machines whereby direct current electrical power is converted into mechanical power. ... A 12v DC motor is small and inexpensive, yet powerful enough to be used for many applications.[24]

Specification:

- Voltage:12V DC
- Gear ratio: 1/31
- No-load speed: 200RPM
- Rated Speed: 140RPM
- Rated torque: 10kg.cm
- Rated current: 2.5Amp
- Length of Motor(including spindle): 106mm/4.17″
- Diameter: 37mm/1.45″
- Shaft length: 21mm/0.82″
- Shaft diameter: 6mm/0.24″

Figure 3.12: DC Gear Motor

3.6 Conveyor Belt

A conveyor belt is the carrying medium of a belt conveyor system (often shortened to belt conveyor). A belt conveyor system is one of many types of conveyor systems. A belt

conveyor system consists of two or more pulleys (sometimes referred to as drums), with a closed loop of carrying medium—the conveyor belt—that rotates about them. One or both of the pulleys are powered, moving the belt and the material on the belt forward. The powered pulley is called the drive pulley while the unpowered pulley is called the idler pulley.

Overview

Conveyors are durable and reliable components used in automated distribution and warehousing, as well as manufacturing and production facilities. In combination with computer-controlled pallet handling equipment this allows for more efficient retail, wholesale, and manufacturing distribution. It is considered a labor-saving system that allows large volumes to move rapidly through a process, allowing companies to ship or receive higher volumes with smaller storage space and with less labor expense.

Belt conveyors are the most commonly used powered conveyors because they are the most versatile and the least expensive.[1] Products are conveyed directly on the belt so both regular and irregular shaped objects, large or small, light and heavy, can be transported successfully. Belt conveyors are also manufactured with curved sections that use tapered rollers and curved belting to convey products around a corner. These conveyor systems are commonly used in postal sorting offices and airport baggage handling systems.

Application

Today there are different types of conveyor belts that have been created for conveying different kinds of material available in PVC and rubber materials. Material flowing over the belt may be weighed in transit using a belt weigher. Belts with regularly spaced partitions, known as elevator belts, are used for transporting loose materials up steep inclines. Belt Conveyors are used in self-unloading bulk freighters and in live bottom trucks. Belt conveyor technology is also used in conveyor transport such as moving sidewalks or escalators, as well as on many manufacturing assembly lines. Stores often have conveyor belts at the check-out counter to move shopping items, and may use checkout

dividers in this process. Ski areas also use conveyor belts to transport skiers up the hill. Industrial and manufacturing applications for belt conveyors include package handling, trough belt conveyors, trash handling, bag handling, coding conveyors, and more. Integration of Human-Machine Interface (HMI) to operate the conveyor system is in the developing stages and will prove to be an efficient innovation.

Types of Conveyor Belt

"There are three different types of conveyor belts: **the basic belt, snake sandwich belt and long belt**. A basic belt conveyor consists of two or more pulleys that hold one continuous length of material. These types of belts can be motorized or require manual effort.

Figure 3.13: Conveyor Belt

3.7 Pulley

A **pulley** is a wheel on an axle or shaft that is designed to support movement and change of direction of a taut cable or belt, or transfer of power between the shaft and cable or belt. In the case of a pulley supported by a frame or shell that does not transfer power to a shaft, but

is used to guide the cable or exert a force, the supporting shell is called a block, and the pulley may be called a sheave.

Table 02: Pulley Product Specification

Product Type	**Motor Pulley**
Size	5mm,
Height	25mm
Outer diameter	12.2mm/0.48
Pitch Diameter	12.7mm/0.5

Figure 3.14: Pulley

3.8 Proteus Software

The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronics design engineers and technicians to create schematics and electronics prints for manufacturing printed circuit boards. The first version of what is now the Proteus Design Suite was called PC-B and was written by the company chairman, John Jameson, for DOS in 1988. Schematic Capture support followed in 1990 with a port to the Windows environment shortly thereafter. Mixed mode SPICE Simulation was first integrated into Proteus in 1996 and microcontroller

simulation then arrived in Proteus in 1998. Shape based auto routing was added in 2002 and 2006 saw another major product update with 3D Board Visualization. More recently, a dedicated IDE for simulation was added in 2011 and MCAD import/export was included in 2015. Support for high speed design was added in 2017.

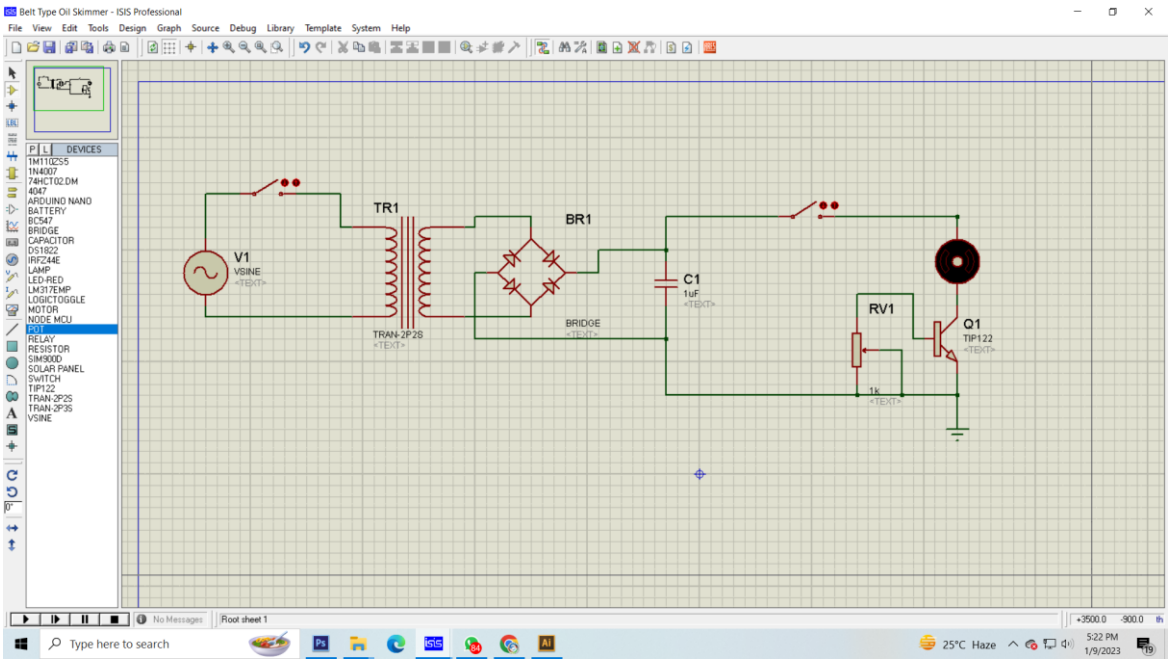

Figure 3.15: Proteus Design of our Skimmer Circuit

CHAPTER 4
METHODOLOGY

4.1 Methodology

Our methodologies for the project:

- Creating an idea for design and construction of **Belt Type Oil Skimmer**. And designing a block diagram & circuit diagram to know which components we need to construct it.
- Collecting all the components and programming the micro-controller to control the whole system.
- Setting up all the components in a PCB board & then soldering. Lastly, assembling all the blocks in a board and to run the system & for checking purposes.

4.2 Block Diagram

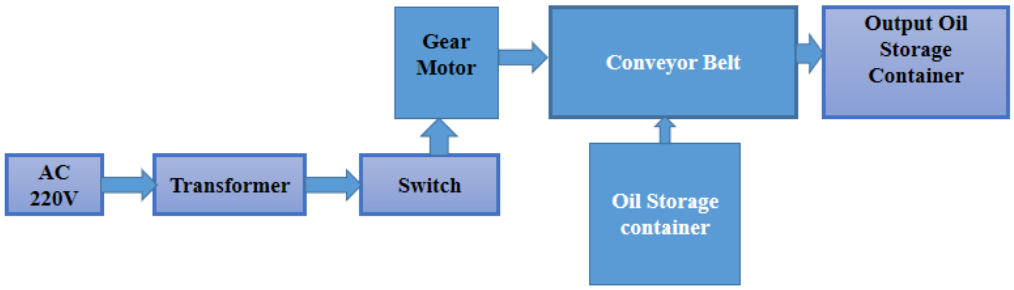

Figure 4.1: Block Diagram of Belt Type Oil Skimmer System.

4.3 Circuit Diagram of proposed Model:

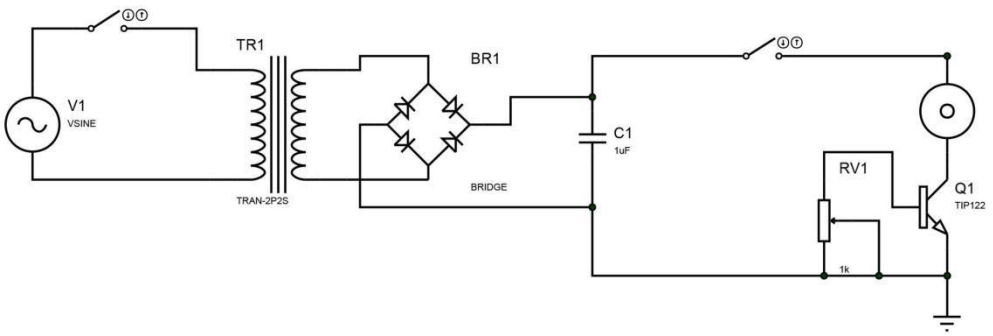

Figure 4.2: Circuit Design of Belt Type Oil Skimmer System.

4.5 Working Principle

When the power up of this system then the system able to work. Then if we start the system then transformer rectifier the AC current and rotate the gear motor. This gear motor is able to control its speed. When we need to oil skimming then just place the system on this water and start out project. Our System will be separate oil from the water easily. This is the mail procedure of our system.

4.6 Basic Drawing of System

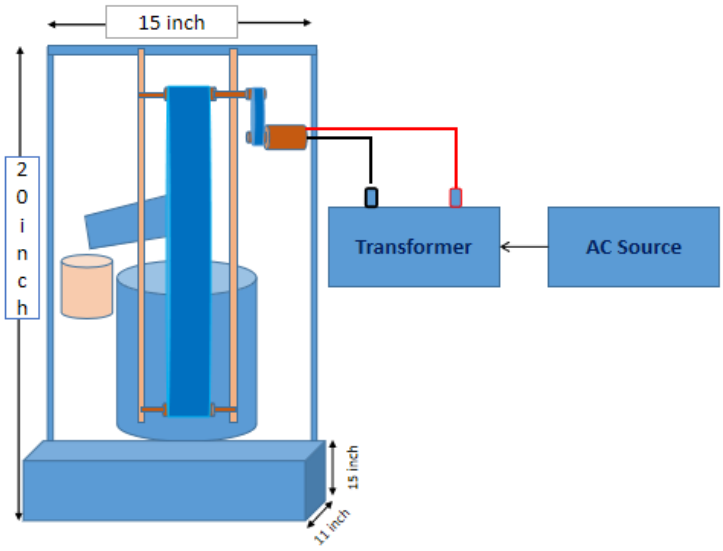

Figure 4.3: Basic Drawing of this System

2.7 Real View of project

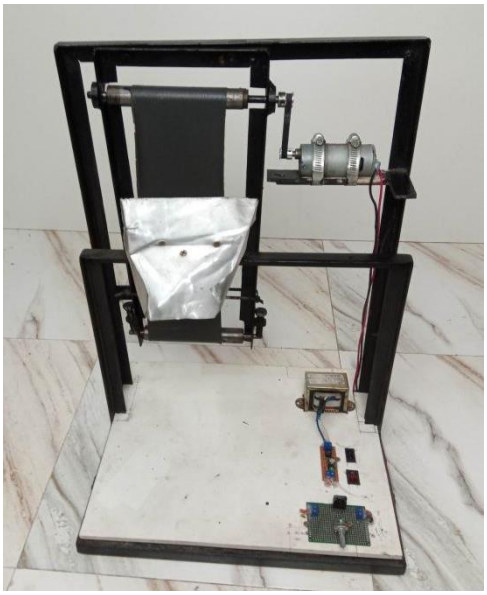

Figure 4.4: Our Project Prototype (Front View)

CHAPTER 5
RESULT AND DISCUSSION

5.1 Result

After making our project we observe it very careful. It works as we desire. Our project give output perfectly and all equipment are work perfectly. We check how much it works and we get perfect output from this project.

- Finally, we have completed our project successfully & check our project its run accurately according to our objective.
- At first, we connect the AC 220 to system on.
- Then when we start the switch then motor will be rotate .
- Then belt will separate the oil from water.
- This motor rotation speed control option is available here.
- Then oil will be store in a jar.

5.2 Discussion

While working on our project, we did face some difficulties as it is a very complex system but the end results, we came up with were quite satisfactory. We have put the whole system through several tasks to validate our work and also have taken necessary notes for future improvements. Some future recommendations that we have involves improvement in system design and wiring, adding features for more efficient.

5.3 Advantages

There are many advantages of our project because of its accuracy. Some of the advantages are pointed out below:

- An oil skimmer helps reduce that threat by removing the oil.
- It’s an automated process.
- The cost of an outside contractor to haul away oil is greatly reduced with the installation of an oil skimmer.
- Time saving machine for industrial work.
- Very effectively work for oil skimming.
- Reduce energy waste.
- Less skill technicians is sufficient to operate.
- Less time and more profit.
- Ease of operation

5.4 Application

The application areas for this project in this modern and practical world are huge and some of these are given below:

- It can be implemented in sea.
- Industry
- On Ship
- Factory

CHAPTER 6
CONCLUSION

6.1 Conclusion

In this project, we enforced to highlight the function of oil skimmer, its various design aspects and performance. All the results of experimental studies indicate that slight design improvement of typical oil skimmers towards to include additional belt shaft and use of belt with steel material instead of rope; significantly improve the oil recovery efficiency and also its structure became simpler. Further extensive research & testing can improve the existing techniques and equipment to have better control for oil recovery exercise.

6.2 Future Work

We are thinking about adding many features to our project in the future to get more desirable out comes. Some of the steps that we are thinking about taking are given below:

- In future we will add some sensor to measure oil quantity in container.
- In future we will add IoT System to operate in fully automatically.
- In future we will add protection equipment to protect this system from any kind of hazard.

REFERENCE

[1] A M Najar, J T Turner, “Enhanced oil recovery using the rotating-disc skimmer”, Proc Instn Mech Engrs Vol 214 Part E, pp. 271-283.

[2] A H Hammoud and M F Khalil,“Performance of a rotating drum skimmer in oil spill recovery”, J. Process Mechanical Engineering, Vol 217, Part E, pp 49-59

[3] Suraj Nair, Kajol Kamble, Sayali Shewale, Sanjay Lohar, “Design & Fabrication of Disc Type Oil Skimmer”, IJSART, Volume 3, Issue 4 – April 2017

[4] Tushar Pathare, Mauli Zagade, Rohan Pawar, Priteshkumar Patil, Prof. A.S. Patil “Endless Belt Type Oil Skimmer”, International Journal of Recent Research in Civil and Mechanical Engineering, Vol. 2, Issue 1, pp. 95-100

[5] Suraj Burungale, Manoj Kamble, Avinash Deokar, Sumit kamble, Prof. Kuber K.H, “**Oil Skimmer** Mechanism in Sugar Factory”, International Journal of Mechanical and Industrial Technology, Vol. 3, Issue 2, pp. 174-176

[6] Broje, V., and Keller, A. A., “Improved Mechanical Oil Spill Recovery Using an Optimized Geometry for the Skimmer Surface”, Environ. Sci. Tech.,2006, vol 40(23) pp. 7914-7918

[7] M. Patel, “Design and efficiency of various belt type oil skimmers”, International Journal of Science and Research, vol 3, pp. 2319-7036

[8] “A Free-Floating Endless Belt type oil skimmer”, Journal of United States Environmental Protection Agency Aug- 1972.