

SUPERVISOR DECLARATION

“I hereby declare that I have read this thesis and in my opinion this report is sufficient in terms of scope and quality for the award of the degree of Bachelor of Mechanical Engineering (Automotive)

Signature:

supervisor:

Date:

DECLARATION

I declare that all parts of this report are the result of my own work except for the quotations and references, the sources of which have been acknowledged in the bibliography.

Signature :

Author :

Date :

ACKNOWLEDGEMENT

Thank you Allah for his blessing because with His permission and divine guidance, I have successfully completed my Final Year Project 2 and this report. First of all, I would like to thank you to Dr Mohd Yusoff Bin Sulaiman as my supervisor because willing to accept me to undergo this topic of project.

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ABSTRAK

Pembangunan dan ujian tenaga ombak telah dilakukan sejak lama di seluruh dunia kerana hal ini dilakukan untuk menggantikan semua jenis pembangkit tenaga yang telah digunakan pada tahun-tahun awal kita dan dikehendaki untuk menukar dan diberikan segala kuasa yang diperlukan sekitar benua. Sistem untuk membina sebuah model yang mempunyai sistem yang akan dikendalikan oleh tenaga ombak dan membuktikan bentuk kuasa yang boleh dihasilkan dengan system tersebut. Setiap kajian akan menimbulkan masalah yang baru dan setiap masalah akan dikaji dan ia juga akan diselesaikan secara menyeluruh untuk pembinaan sebuah system yang baik dan mempunyai kecekapan yang tinggi. Dari kajian ilmiah yang dilakukan, ianya telah membantu dalam menyelesaikan banyak masalah yang terjadi semasa proses perancangan dan menentukan kriteria yang tepat untuk sistem yang ingin digunakan. Setiap tindakan ini akan membantu untuk menghasilkan satu system janaan ombak yang dapat menghasilkan kuasa bentuk generator akan membantu untuk membuktikan generator tersebut dapat berfungsi dengan baik.

ABSTRACT

Building and testing of wave energy has been done long ago. Around the world as this is done to replace all type of energy generator that has been used in our early years and it is desired to replace and supplied all the power needed around the continent. Here , have try to follow that act and gives more of effort to this project as to research the track of this Wave Energy Generator System and to build a model that have the system to be operated by wave energy and proves that power can be generated form that kind of system. Each of the problem arise shall be research and tackle evenly as this will produce a design system that can worked properly and produce a higher power efficiency than before. From literature review that has done, it has helped in solving a lot of problem that occur during the designing process and to determine the right criteria for the system that desired to use. Each of these acts will help to produce one Wave Energy Generator successfully and the power produce form the generator will help to proves that the generator can perform the best quality energy ever. After each power data have been developed and taken, it has resulted in an interesting fact and it has proves that this system is potential to produce power as it is related to the wave energy that has been generating the system desired. Every inched of the wave will be converted into one of the most useful energy today that can be used to power our home appliances and can bring more faith to the consumer that is an electric energy.

TABLE OF CONTENTS

	PAGE
DECLARATION	ii
ACKNOWLEDGEMENT	iii
ABSTRAK	iv
ABSTRACT	v
TABLE OF CONTENT	vi
LIST OF FIGURES	vii
LIST OF TABLES	viii
LIST OF EQUATIONS	ix
CHAPTER 1 : INTRODUCTION	1
1.1 : Scope	1
1.1.1 : Wave Energy	2
1.1.2 : Tidal Energy	3
1.1.3 : Ocean Thermal Energy Conversion (OTEC)	4
1.1.4 : Theory	5
1.2 : Introduction	5
1.3 : Objective	6
1.4 : Advantages and Disadvantages	8

1.4.1	: Advantages	8
1.4.2	: Disadvantages	9
1.5	: Early Research and Problem	10
CHAPTER 2 : LITERATURE REVIEW		12
2.1	: Ocean Energy	12
2.2	: Wave Energy	14
2.3	: Parts of Waves	15
2.4	: Tidal Energy	16
2.5	: The Live of Waves	18
2.6	: Wave Energy Development Status	19
2.7	: Principles and Method of Wave Energy	23
2.7.1	: Oscillating Water Columns	23
2.7.2	: Overtopping Device	24
2.7.3	: Heaving Device	24
2.7.4	: Pitching Device	25
2.7.5	: Surging Device	25
2.8	: The Technology Has Been Developed	26
2.8.1	: Shore and Near Shore Wave Converters	26
2.9	: Wave system	31
2.9.1	: Kinematic System	31
2.9.1.1	: Gearing System	31

2.9.1.2 : Drive and Driven System	32
2.9.1.3 : Chain System	33
2.9.1.4 : Flywheel System	35
2.9.1.5 : Dynamic Movement System	36
CHAPTER 3 : METHODOLOGY	37
3.1 : Objective	37
3.2 : Problem Statement	38
3.2.1 : High Costs Construction	38
3.2.2 : Unsuccessful Wave collection	39
3.2.3 : System Cannot Withstand	39
3.3 : Sketching Concept	40
3.3.1 : Sketching Explanation	40
3.4 : Theory and Analysis	42
3.5 : Theory Will Be Applied	45
3.6 : Testing and Experiment (Theory)	51
CHAPTER 4 : RESULT FABRICATION	52
4.1 : Fabrication of wave energy generator	52
4.1.1 : Material	53
4.1.2 : Dimensional	55

4.2	: Final Assembly	56
CHAPTER 5 : CONCLUSION AND RECOMMENDATION		57
5.1	: Recommendation	57
5.2	: Conclusion	58
REFERENCES		59

LIST OF FIGURES

NO.	TITLE	PAGE
1.	Figure 1 Oscillating Water Column	14
2.	Figure 2 Characteristic Parameters of an Ideal Wave Train	15
3.	Figure 3 Tidal Turbine and Tidal Fence	16
4.	Figure 4 The Shim Wind-Wave Device	21
5.	Figure 5 Outline of the Pendulor	21
6.	Figure 6 Side View of the Limpet OWC	23
7.	Figure 7 Over Topping Device	24
8.	Figure 8 Heaving Buoy Device	24
9.	Figure 9 OWC principle	26
10.	Figure 10 Tappered Channel	27
11.	Figure 11 Pelamis System Overview	29
12.	Figure 12 Sketching concept	40
13.	Figure 1 Flywheel	52
14.	Figure 2 Bearing	52
15.	Figure 3 Belting	53
16.	Figure 4 Buoy	53
17.	Figure 5 Buoy Shaft	53
18.	Figure 6 Gear Connector	53
19.	Figure 7 Flywheel Holder	54
20.	Figure 8 Buoyancy Holder	54
21.	Figure 9 Base Holder	54
22.	Figure 10 Connecting Base	55

LIST OF TABLES

NO.	TITLE	PAGE
1	Chain size table	47

LIST OF EQUATIONS

NO.	TITLE	PAGE
1. Equation 1	Drive and Driven System	32
2. Equation 2	Gearing System	33
3. Equation 3	Gearing System	33
4. Equation 4	Gearing System	33
5. Equation 5	Chain System	34
6. Equation 6	Chain System	34
7. Equation 7	Flywheel System	35
8. Equation 8	Flywheel System	35
9. Equation 9	dynamic movement system	36
10. Equation 10	dynamic movement system	36
11. Equation 11	dynamic movement system	36
12. Equation 12	Potential energy	42
13. Equation 13	potential energy	43

CHAPTER 1

INTRODUCTION

1.1 SCOPE

Fabrication of a wave energy generator is a title for my final year project. As we know, Ocean waves are formed when wind blow across a large body of water. The potential for waves to supply energy is enormous. The amount of power a wave can produce is related to its height and average speed. This has happened in the case of the Tsunami that happened at the Hindi ocean which has claimed up to 300,000 people and destroyed millions of property and includes all natural life in the vicinity of the disaster (Scigliano E, 2005). In this case, we can see that the ocean wave can give a new source of energy to the world and the energy has produce from ocean wave is strong. Geologists estimate the submarine earthquake that caused the tsunami disaster has resulted in a force that is greater than all the explosives used in World War 2.

So here we can see that the waves can be exploited to the maximum to help our daily lives. Currently, there are only a handful of power plants that take the power that comes from the sea. But how can we exploit the power of the ocean to the maximum to be a source of energy that we need at this time. There are three basic how we can extract or use the ocean as a source of power we needed. First, we can use the power of ocean waves, using the high tide and low tide or whether we can use the temperature changes that occur in sea water.

1.1.1 Wave Energy

Kinetic energy (movement) exists in the moving waves of the ocean. That energy can be used to power a turbine. In this simple example, to the right, the wave rises into a chamber. The rising water forces the air out of the chamber. The moving air spins a turbine which can turn a generator.

When the wave goes down, air flows through the turbine and back into the chamber through doors that are normally closed.

This is only one type of wave-energy system. Others actually use the up and down motion of the wave to power a piston that moves up and down inside a cylinder. That piston can also turn a generator. (www.hawaii.gov/dbedt/ert/otec-nelha/otec.html)

Most wave-energy systems are very small. But, they can be used to power a warning buoy or a small light house.

1.1.2 Tidal Energy

Another form of ocean energy is called tidal energy. When tides come into the shore, they can be trapped in reservoirs behind dams. Then when the tide drops, the water behind the dam can be let out just like in a regular hydroelectric power plant.

Tidal energy has been used since about the 11th Century, when small dams were built along ocean estuaries and small streams. The tidal water behind these dams was used to turn water wheels to mill grains.

In order for tidal energy to work well, you need large increases in tides. An increase of at least 16 feet between low tides to high tides is needed. There are only a few places where this tide change occurs around the earth. Some power plants are already operating using this idea. One plant in France makes enough energy from tides (240 megawatts) to power 240,000 homes.

This facility is called the La Rance Station in France. It began making electricity in 1966. It produces about one fifth of a regular nuclear or coal-fired power plant. It is more than 10 times the power of the next largest tidal station in the world, the 17 megawatt Canadian Annapolis station. (www.hawaii.gov/dbedt/ert/otec-nelha/otec.html)

1.1.3 Ocean Thermal Energy Conversion (OTEC)

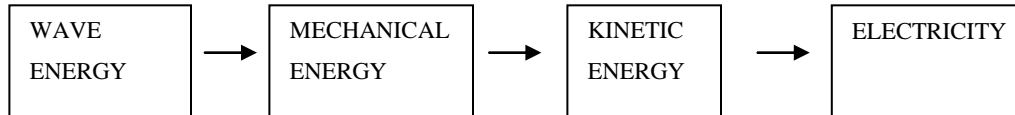
The idea is not new. Using the temperature of water to make energy actually dates back to 1881 when a French Engineer by the name of Jacques D'Arsonval first thought of OTEC. The final ocean energy idea uses temperature differences in the ocean. If you ever went swimming in the ocean and dove deep below the surface, you would have noticed that the water gets colder the deeper you go. It's warmer on the surface because sunlight warms the water. But below the surface, the ocean gets very cold. That's why scuba divers wear wet suits when they dive down deep. Their wet suits trapped their body heat to keep them warm.

Power plants can be built that use this difference in temperature to make energy. A difference of at least 38 degrees Fahrenheit is needed between the warmer surface water and the colder deep ocean water.

Using this type of energy source is called Ocean Thermal Energy Conversion or OTEC. It is being demonstrated in Hawaii. More info on OTEC can be found on the archive pages for the Natural Energy Laboratory of Hawaii.

1.1.4 Theory

For my final year project, my system is basically following this theory:



If u can see from the mechanical theory, the system will be constructed will follow as a wave motion up and down movement and wave will be moved the buoyancy for change that energy to the mechanical energy and shaft will be moved and produces the kinetic energy and after that produces the electricity from that movement.

1.2 INTRODUCTION

The reduction in carbon dioxide emissions which is increasingly pressing and is a major goal of governments and societies, has bestowed and increased importance on wave energy as on all renewable energy source. Interest in wave energy power plants, which could make appreciable contribution to the world energy supply, is steadily growing. The use of wave energy for generating electric power has been under investigation for many decades. However, the countless, sometime extremely naïve suggestions for the applications of wave energy have given this renewable energy source a dubious aftertaste in the public perception. But the long term commitment of a few research teams is now leading to rethinking of this view.

Water waves produced by the wind are generated mainly over deep water. Their shape depends on the wind velocity, the duration of the wind, and the distance they have propagated since they were formed. The regions of the ocean surface with the most

wave energy are therefore the open oceans far from the equator. The wind is subject to friction with the surface of the ocean water, pushes on individual water particles and thus accelerates the water layers near the surface. Turbulence in the airflow gives rise to pressure differences between different parts of the water surface. To equalize these differences, the surface rise and sinks. This now rough surface is subject to ever longer stronger pressure difference from the wind, which in turn increased the amplitude of the surface roughness. In this way, higher and higher quasi periodic waves are formed (Griffiths John W 2001).

Wave dynamic in the end limit further growth of the waves. The simple model of “Linear wave theory “already gives a realistic value for the maximum wave height. According to linear wave theory, the individual water particles in the waves attain speeds at the top of the wave’s crests which are greater than the propagation velocity of the waves.

1.3 OBJECTIVE

The development of a tool will exploited the wave energy and will turn into other energy which can used to the community is more valuable. The development of this technology, we can see how a system can be used to provide benefits to the community after over the years the community depend on the oceans as a source of their income. With the wave development we will do, it can give new inspirations to build a new energy source.

Form the financial view hopefully, with this new energy sources, the other energy prices will be reduced and can be enjoyed by everyone this is because the exploitation

from the wave energy source is free and the other cost from the tool development can be reduces and will give a cheap energy source.

Renewable energy is important because it will reduce the pollution around us because wave's energy is the renewable energy. As we know, Ocean waves are formed when wind blow across a large body of water. So it is a clean source of energy and can be applied continuously and also does not pollute the environment.

With a developing country, the demand to the energy is needed and if we only rely on the old energy source, we may be facing energy crisis and this will give big problems to the country development. With the development of new energy sources are taken from the wave is expected to help to meet the energy needs are becoming more common in the developing countries, especially Malaysia.

All efforts will be success if they are done with great effort and helping to create a great new energy source to replace the expensive old energy sources.

1.4 ADVANTAGES AND DISADVANTAGES

In this project, there is having advantages and disadvantages in this project which is:

1.4.1 Advantages

➤ Not Expensive To Operate And Maintain

According to the U.K. Department for Business Innovation & Skills, the cost of running a wave energy generator is very low after its initial construction, giving it a large advantage over other renewable energy sources. The only costs include general maintenance. There is no need for fuel, and there is no waste product produced by the wave power device.

➤ The Energy Is Free – No Fuel Is Needed And No Waste Is Produced

This free energy is because it does not require any fuel and does not produce any waste. If we see of the wave making process, the system requires no fuel to turn on the system and this system does not produce any waste because it does not use any fuel.

➤ Zero Pollution

Wave energy boasts the advantage of causing little to no pollution, according to the government of Hawaii. The only mild waste created is during the construction of the wave energy generator, which can be reduced by mitigation measures. Mitigation measures are regulations set forth by the government to regulate emissions during construction of the equipment. This is an important aspect, as many other renewable energy sources, such as nuclear energy and fossil fuels, produce waste and thermal pollution.

➤ Significant Energy Production

Due to its abundance and substantial power, wave energy can produce a significant amount of energy. According to the Hawaiian government, estimates indicate that wave energy could produce close to 16 percent of the world's electricity consumption. The United States Minerals Management Service suggests that it could power entire local communities.

1.4.2 Disadvantages

➤ Needs A Suitable Site, Where Waves Are Consistently Strong

According to the U.K. Department for Business Innovation & Skills, wave energy requires a consistent supply of powerful waves to fuel a community's electrical needs, making it less reliable than other energy sources. Waves, while they are in abundance, are not always consistent. The coasts of Japan, New Zealand, and the west coast of the United States would be good sites for wave energy generators.

➤ Some Designs Are Noisy

There is some rather noisy construction system. This might happen because it uses a system of rotation using the generated by wind turbine. This is because when the wind blows the system then it is cause noise pollution.

➤ Must Be Able To Withstand Very Rough Weather

The system need to withstand for the rough weather this is because the ocean weather is not stable. Despite inventors actively making systems to capture power from the waves, for the last two centuries, there is still not a wide application of wave energy devices as power generators. The availability of devices to fit different applications is not the

problem, the technology is definitely there. The reality is that the only long term problem is making the technology work at a cost of power which a consumer is willing to pay. The system will work itself out. The price of fossil fuel generation will become more and more expensive and wave generated power will fall in price.

1.5 EARLY RESEARCH AND PROBLEM

A preliminary investigation to use waves as alternative energy sources has been started since 30 years and use the waves as a source of power began more than two decades ago where in 1799 a French citizen and his children has tried to build a large patents are placed on a floating vessel. This system will move left and right according a movements waves and it will be generated such as pump and mills. Two decades have passed, and the oil has been causing this technology once again been overlooked, but now the price after the price of fuel has increased considerably, so here comes the waves of energy to alternative energy to new energy production.

Wave energy is easy to see, but the problem is still a hot debate is how the system is to collect and exploit to the maximum wave energy. There are 3 theories that can help in any way collect the wave;

➤ Surface Devices

Surface Devices include devices that directly use the motion of the ocean surface. This tools will be generated the electricity from up and down movements. They generally include a floating surface that moves up and down due to the buoyancy force of waves (Eren 2002).

➤ Oscillating Water Columns Device

Oscillating Water Columns (OWC) are devices that involve creating a structure on the shoreline such that waves enter and leave a static chamber. The motion of the water pushes air up when it enters and pulls air back as it leaves. This oscillation of air pressure turns a turbine to generate electricity (Eren 2002).

➤ Overtopping Devices

Overtopping Devices consist of a structure that collects incoming waves by creating a reservoir into which only tall waves may crash. Therefore waves must overtop a barrier to be collected. Then the reservoir is emptied out below through a turbine collecting the potential energy of the reservoir (Eren 2002).

Each of this system will probably come up with the new problems as;

- Expensive.
- Could not withstand with the sea weather.
- Unsuccessful wave collection.
- Placed are not suitable for the system.
- The operations of the system are not consistent.

CHAPTER 2

LITERATURE REVIEW

2.1 OCEAN ENERGY

Covering more than 70% of the Earth's surface, the ocean is the world's largest untapped, renewable energy resource. It produces both mechanical energy from its tides and waves and thermal energy from the sun's heat. As new technologies are developed, ocean resources will be able to meet many of the world's energy needs. Experts estimate that 0.2% of the ocean's untapped energy could power the entire world.

Oceans cover almost three-fourths of the earth's surface. The oceans and the land beneath them could provide all of the energy the world needs for years to come. Today, more than a fourth of the oil and gas produced in the United States comes from offshore areas. The beach extends from the shore into the ocean on a continental shelf that