Green Application: Electric Charge Generated From Any High Temperature Heat Source

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Abstract—*The prime objective of the environmental friendly project ECO Electro Green device is to decrease the amount of carbon monoxide in the air and thereby to bring down the air pollution and save the environment. The proposed system will use natural gas (propane burner) as an alternate conversion energy source to generate electrical charges, particularly in forest and coastal areas. The demonstration shows that the system, when functioning under optimum conditions, has the potential to generate significant amount of electrical charges. For the project, dynamo, heater, cooler, piping systems and flywheel were designed, constructed and then analyzed. The current system was then set up using an external heat source as it can run on any source that makes heat as natural gas. To conclude, this system is the new methodology for generating electric charges that reduce pollution and save electrical cost.*

Keywords—ECO Electro, Flywheel, Electric Charge, Green Technology, Natural Gas.

I. INTRODUCTION

Energy production is an important area in Malaysia since it is a country rich with natural resources diversity, as stated in the website of the Ministry of Information, Communication and Culture, Malaysia. The government, in agreement with the objectives of the National Energy Policy, promotes the involvement of various industry sectors to supply Malaysia with abundant, secure and cost-effective energy [1].

Energy is a very important element of our lives, and the more advanced human society have unrestrained dependence on energy in their daily life. But uninhibited use of energy without considering its negative impacts will consequently result in natural disasters. The production of hydroelectricity is not easily feasible because construction of dams requires huge capital and large land that leads to destruction of surrounding flora and fauna.

Hence, it is important that we find energy alternatives to reduce the use of electricity in our daily lives. The use of renewable energy is one such alternative that does not cause any damage to natural resources. To increase the use of renewable energy, it is necessary to achieve cost-effectiveness to make it economically viable, and attain consistency through energy storage to reduce the inherent variability of renewable energy sources. The burning concept is applied for the renewable sources such as the sunlight, wind, and heat source [2].

The concept of ECO Electro Green device originated after much research and analysis, and after addressing the potential problems that may arise. ECO Electro Green device is an electric generator that produces electricity from heat source. The system encloses the working fluid and functions on a regenerative thermodynamic cycle. A few pistons in the system are exposed to a hot source and a cold source, alternately [3]. The working fluid compresses within the cold space, and is then transmitted to the hot space to expand and work on the piston. The heat source that will be used to operate the engine has been identified. The engine type is selected and its primary components are designed based on the suitability for the source. At the end, it is concluded that the piston of the system uses mechanical force to produce the electricity.

II. METHODOLOGY

Methodology refers to the principle of solving problems and creating something by using research, technique, method, equipment and so on. This project began with extensive research on the design and history of the ECO Electro Green concept. A prototype engine was constructed to analyze the principles of ECO electro system design and functioning. The final idea originated when the engine operated in the 500–700 Watt range [4]. A gasoline liquid and petrol was used as the heat source for the engine. We designed this project to be more versatile, where the intention was of using concentrated propane gas burner as the heat source. One of the key objectives of this project was to keep it easily maintainable and modifiable, and enable free handling.

Design

The design phase commenced with research of the history and design of ECO Electro Green. An engine prototype was constructed to ensure that the system operates efficiently and successfully before it was proposed for real application. The proposed assembly parts of the ECO

Electro Green engine are shown in Fig 1. In contrast to machining the engine parts, this design choice was better.

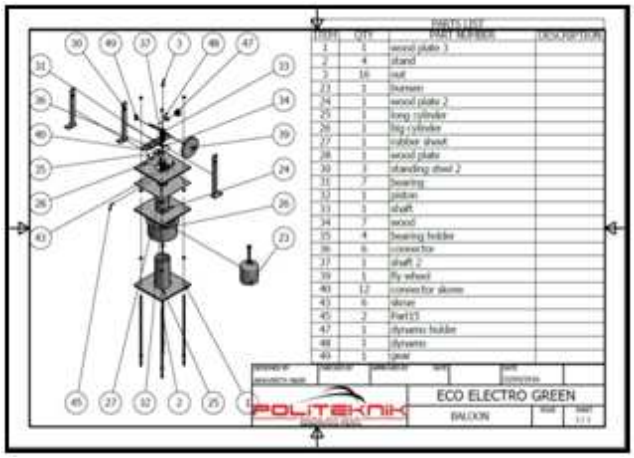

Fig.1: Assembly parts of the engine

Manufacturing and Design

Manufacturing and design consists of different technologies and methodologies that imitate an activity of complex problem-solving. It also involves the use of scientific concepts as the foundation of the principle of problem-solving. Design is a rational process of decision-making that attempts to select the best solution appropriate to the scope of the problem.

In the design of this system, the problems are observed and analyzed from different aspects and a solution is derived by using the existing experience, mathematical analysis and problem-solving. The design phase also uses the results of different experimental research carried out by others or us.

The process of manufacturing and design is very complex and recurrent. It implies that this process is not a one-way process that can be easily illustrated [5]. In most cases, the process undergoes certain phases. For instance, any two designers may analyze the same concept, but the resulting outcomes will be entirely different from each other.

Fig 2 presents an internal view of the piston, seen once the caps on the engine are removed. In order to create the cycle necessary to run the engine, the remaining empty space is filled to ensure that the airflow created by the piston stays inside the piping.

Fig 2: Setting piston inside the cylinder

Fig 3 presents the crankshaft which is made up of a metal rod precisely bent to hold the piston connecting rods in alignment. The cranks or the two bends must be balanced at exactly 90 degrees, and the distance from the centerline of the crankshaft to the end of the crank must be ¾ inches.

Fig 3: Fix the shaft

Some of the mechanical energy produced by the power stroke of the cycle is stored in the flywheel. This stored energy is then returned to the crankshaft when the pistons attain their full extension, refer to Fig 4. This technique helps to avoid the locking up of the pistons and facilitates continuous motion within the engine. The proposed design of the flywheel is such that it can store abundant energy to overcome the measured torque needed to start the engine. The disks were bolted together. A small gear was fixed with the dynamo to create the electric charges. Also, a bolt was used to join the assembly to the output shaft of the engine [6].

Fig 4: Flywheel with shaft attached to dynamo

III. RESULTS AND DISCUSSION

To record the voltage generated by the ECO Electro engine, a voltmeter is used. As shown in Fig 5, there was a considerable difference in the voltage output. When the recorded values for voltage were further analyzed, it was observed that the values did not change corresponding to the various resistors plugged into the circuit. It can be noted that as the resistors value drops, the voltages reduces as well. The dynamo was unable to run in the absence of

certain kind of resistance included in the circuit since the voltage created was going back into the dynamo and trying to spin the shaft in the contrasting direction of the drill, overburdening the drill at just a few hundred RPM.

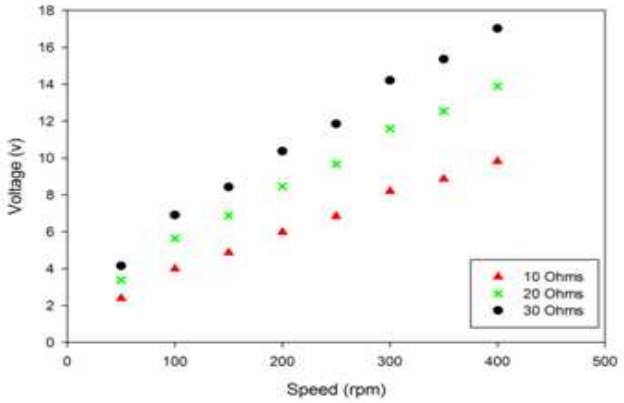

Fig.5: Voltage output by ECO electro engine based on different resistors

The recording of internal temperature is done through used thermocouples. This is to make sure we are attaining the temperature differential so as to operate the ECO engine. Fig 6 indicates the rise of temperature as heat was applied over a period of time. The maximum temperature attained inside the tank was 549.1^{o}C, whereas the temperature outside the tank was 442.9^{o}C. Thus, the difference in temperature was 106.2^{o}C. The temperature variations take place at about 90 seconds for either location in the ECO electro engine. The fluctuation is eventually released and steadies over the time period. The steadying of temperature in graph is contingent on the kind of heat source and realigning of the propane burner.

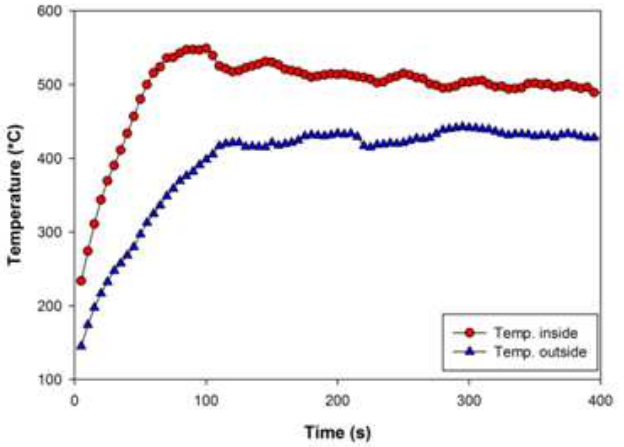

Fig.6: Heat variation in two locations over a time

IV. CONCLUSION

We have been successful in producing a current from the ECO electro engine after accomplishing the prototype procedure of designing and manufacturing [7]. However, it has revealed the insight view of the engine and requires more alteration. We conceived formulas to estimate a voltage output at various temperature differentials, based on our familiarity with thermodynamics to the sign of the engine. Furthermore, we could build the engine and inculcate the tools required to register temperature-related information inside as well as outside the engine. The graph indicates that our engine is attaining a maximum voltage of 17.02V. This was adequate to supply the LED light that was affixed at the engine for successful functioning. However, the significant friction taking place within the compressor could be taken care of by means of the bearings and bushings alongside the crankshaft. Even though our design was unable to withstand the work conversion from the heat of the burner to the crankshaft's mechanical rotation, we could build an engine and sustain a temperature differential within the system.

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