Abstract
The Combustion Engine is the World’s standard energy converter for Transportation and Electricity Generation. The Combustion Engine uses the Crankshaft to amplify the Chemical Energy to Kinetic Energy. What other energy used to turn a Crankshaft? Magnetic Energy used to turn a Crankshaft. The benefit of using Magnetic Energy is that the Crankshaft turned a haft stroke. The haft stroke decreases the power required to turn the Crankshaft and increases the power output. The Crankshaft will be used for Transportation or Electricity Generation.
Title Page

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Magnetic Renewable System
Energy Conversion System
White Paper

Introduction
CleanTech Energy

Producing Clean Renewable Electric Transportation & Green Renewable Electricity Generation ending the need for Fossil Fuels & its Climate Effects

Energy, there are many types. The types of energy we use depend on the objectives, heat, motion, and light are just a few. The primary objective of energy that we used is for Transportation and Electricity Generation. These objectives use many types of energy, heat to turn a wheel and generator, Motion from water and wind to turn a generator. There was one common way to produce energy for both Transportation and Electricity Generation.

The World’s primary source of energy for Transportation and Electricity Generation is fossil fuels, used in Mechanical Energy Systems. A Mechanical Energy System is an energy converter. It converts one source of energy to another. Using fossil fuels as the initial energy source has changed the World in Transportation and Electricity Generation.

Fossil Fuels problems:
- Limited Supply
- The Cost of the Supply
- The Climate Effects of the Supply

It is time for a Mechanical Energy System that will replace the Combustion Engine in Transportation and most standard systems in Electricity Generation. It is time to end the need for fossil fuels. It is time for a Mechanical Renewable Energy System that produces Zero Emissions, which has no effects on the environment. The standard Mechanical Renewable Energy Systems powered by wind, water, solar, and geothermal.

A new Mechanical Renewable Energy System does not require fossil fuels and does not harm the environment. It will replace the Combustion Engine in transportation. It will replace most forms of Electricity Generation Systems. A Mechanical Renewable Energy System is the World’s energy solution.

The Magnetic Renewable System is a clean and green Mechanical Renewable Energy System powered by electricity. It is the combination of two systems, the Electromagnetic Reciprocating Engine and an Electrical Power System.

The Electromagnetic Reciprocating Engine is the Combustion Engine without the combustion. The secret lies in “Can a magnetic force push down on a piston” which culminated in the development of the Magnetic Chamber. This research concluded with a US Patent #7,557,473. The Electromagnetic Reciprocating Engine uses Magnetic Energy from an electromagnet, powered by electricity, in the Magnetic Chamber to turn a Crankshaft. The Magnetic Chamber moves in a linear motion. The Crankshaft converts linear motion into a rotating motion. Allowing the Crankshaft to produce horsepower and torque every .5 Stroke. The Crankshaft connects to a transmission for Transportation or a generator for Electricity Generation.

The Electrical Power System, does not create energy, it is a converter, which starts with stored Electricity. It takes electricity from a battery, converts it to Magnetic Energy using electromagnets, and converts that Kinetic Energy using the Crankshaft. The electricity, stored in a
battery, is the primary energy source. The energy is sent to electromagnets, which turn that electricity into Magnetic Energy, Magnetic Force. The Magnetic Force is used to turn a Crankshaft. The Crankshaft will increase the energy using Mechanical Advantage and send that Kinetic Energy, to two places: 1) Sends part of the energy as Electricity, by turning an Alternator, back to the battery and electromagnets. 2) Sends the remaining energy, Kinetic Energy, using a shaft, which can turn either a generator or a transmission.

The Magnetic Renewable System can produce various amounts of horsepower and torque. Two things control the horsepower, the size of the Crankshaft, which dictates the amount of Magnetic Force needed from the electromagnets and the number of Magnetic Chambers.

The Military can use the Magnetic Renewable System to end its dependence on fossil fuel. The US Military has concluded that energy supplies are vital for security, energy security. The Department of Defense operational energy challenges to ensure the consistent delivery of energy to the Warfighter 2016 Operational Energy Strategy has objectives:

- Increase in future war fighting capability by including energy throughout future force development.
- Identify and reduce logistics and operational risks from operational energy vulnerabilities.

**Magnetic Renewable System Objectives**

- Increase Future Energy
- Unlimited Operation Range
- No Supply Lines for Fuel
- Camouflage – Low Sound, No Exhaust, Low Temperatures

The Magnetic Renewable System will replace all the vehicle engines, electricity generators, marine engines and propeller engines in airplanes.

**Magnetic Renewable System**

- No Fossil Fuels
- No Fuel Cost
- Zero Emissions
- Clean Renewable Transportation
- Green Renewable Electricity Generation

The Magnetic Renewable System has four configurations. Each configuration has a specific application.

**Renewable Electric Transportation - RET**

- Magnetic Renewable Engine – Vehicles & Equipment
- Magnetic Renewable Motor – Trains & Ships
- Magnetic Renewable Aircraft Engine – Propeller Aircraft

**Renewable Electricity Generation - REG**

- Magnetic Renewable Generator – Electricity
The World is having problems with the types of energy used in Transportation and Electricity Generation. Fossil fuels (Oil, Natural Gas, and Coal) are the primary sources of energy. Fossil Fuels are a limited resource, and causes Climate Change.

- Energy Sources
- Environment
- Energy Expense

### 1.1 Energy Sources

Expanding energy sources will require trillions of dollars in investments. The IEA estimates that meeting the world’s energy needs will require expenditures on the energy-supply infrastructure of approximately $1.6 trillion per year on average through 2035. About half of the investments relate to projected Oil and Natural Gas needs, while approximately 45% relate to expected power generation requirements.

The US Military has concluded that the energy supply is vital for security, energy security. The Department of Defense has completed a plan in June 2011, Operational Energy Strategy that outlines three ways to increase energy security:

- Reduces demand for fuel
- Diversify energy supply
- Incorporating these considerations into building the future force

### Problems with fossil fuels:

- The dependency on the types of energy
- The cost of supplying the sources of energy
- The effects of energy on the environment

#### 1.1.1 Current Energy Systems

##### 1.1.1.1 Mechanical System

The existing technology for producing energy is Mechanical Energy Systems. The Mechanical Energy Systems are energy converters. It converts energy from one form to another for Transportation Systems and Electricity Generation Systems. The initial energy is in various forms, Chemical Energy, Electrical Energy, Mechanical Energy and Thermal Energy. The Mechanical Energy converts to rotational motion, which mechanically turns a shaft. The exception is the Combustion Engine that turns a Crankshaft.

There are two exceptions, Solar Panels and Hydrogen Fuel Cells uses no mechanical movement to produce electricity.

#### Transportation

- **Combustion Engine (Chemical Energy)** – Converts fossil fuels, Gasoline, Diesel & Natural Gas, to Kinetic Energy to turn a Crankshaft.
- **Electric Motor (Electrical)** – Converts electricity to Magnetic Energy to Kinetic Energy to turn a shaft.
- **Hybrid Engine (Chemical & Electrical)** – It is a combination of the Combustion Engine and the Electric Motor.

#### Electricity Generation

- **Combustion Engine (Chemical Energy)** – Converts fossil fuels, Gasoline, Diesel & Natural Gas, to Kinetic Energy to turn a Crankshaft.
- **Fossil Fuels (Chemical Energy)** – Converts fossil fuels (Oil, Coal, & Natural Gas) to steam which turns a turbine, to Kinetic Energy to turn a shaft.
- **Nuclear Power (Thermal Energy)** – Converts fusion heat to steam, which turns a turbine, to Kinetic Energy to turn a shaft.

##### 1.1.1.2 Mechanical Renewable System

The difference between Mechanical Energy Systems and Mechanical Renewable Energy System is the initial form of energy. The sources of energy for Mechanical Renewable Energy Systems are unlimited.

#### Transportation

- **Wind Power (Kinetic Energy)** – Converts wind to Kinetic Energy using a sail.

#### Electricity Generation

- **Wind Power (Kinetic Energy)** – Converts wind to Kinetic Energy to turn a shaft.
- **Water Power (Kinetic Energy)** – Converts water movement to Kinetic Energy to turn a shaft.
- **Solar Mirror (Thermal Energy)** – Converts sun to heat to steam, which turns a turbine, to Kinetic Energy to turn a shaft.
- **Geothermal Power (Thermal Energy)** – Converts heat to steam, which turns a turbine, to Kinetic Energy to turn a shaft.
1.1.2 Energy Supply Dependency

Fuel Sources:
• Oil (Gasoline & Diesel)
• Natural Gas
• Coal
• Nuclear

1.1.2.1 Oil

The World’s Oil supply is a limited resource. Different organizations have different durations, but they all agree that Oil will end. In 2002 ExxonMobil charted, that Oil should end around 2040. There are new oil supplies, but the supply is limited.

Oil, fossil fuel, remains the top global energy source and the fuel of choice for transportation. Demand for Oil is projected to rise by approximately 25% through 2040, led by increased commercial transportation activity. A growing share of this demand will be met by sources such as deep-water, oil sands and tight oil, which are increasing because of advances in technology.

The International Energy Agency’s (IEA) World Energy Outlook 2010 projected world Oil production to increase through 2035, with depleting conventional Oil being replaced by fields yet to be found and fields yet to be developed.

To avoid the serious social and economic implications a global decline in Oil production could entail, the 2005 Hirsch report emphasized the need to find alternatives, at least ten to twenty years before the peak, and to phase out the use of petroleum over that time. This was similar to a plan proposed for Sweden that same year. Such mitigation could include energy conservation, fuel substitution, and the use of unconventional Oil. Because mitigation can reduce the use of traditional petroleum sources, it can also affect the timing of peak Oil and the shape of the Hubbert curve. The less we use, the longer it will last.

1.1.2.2 Natural Gas

Natural Gas, a fossil fuel, will contribute the biggest growth in energy supplies. Natural Gas is affordable, widely available, extremely versatile, and emits up to 60% less Carbon Dioxide than Coal when used for Electricity Generation. Natural Gas emits Methane, which is a greenhouse gas that is 84 times more potent effects on the climate.

Natural Gas expected to become more important in the global energy mix, accounting for more than 25% of global energy needs by 2040, as Natural Gas demand rises by about 65%.

Natural Gas primarily used for producing electricity, but can replace Oil in transportation. New ways of extracting Natural Gas have increased the supplies. Just like Oil, there are limits on the supply of Natural Gas.

1.1.2.3 Coal

Coal, a fossil fuel, is currently the top fuel for Electricity Generation and accounts for the second-largest share of energy supplies today. We expect demand will continue to rise until around 2025 and then decline – despite the existence of a huge resource base. Driving this decline will be demand reductions in OECD countries as well as in China, which today consumes approximately half of the world’s coal production. By 2040, we anticipate that Coal’s share of the global energy mix will fall from approximately 25% in 2010 to below 20%.

1.1.2.4 Nuclear

Nuclear Energy will see solid growth. While some countries scaled back their nuclear expansion plans in the wake of the 2011 Fukushima incident in Japan, many other countries are expected to expand the use of this energy source to meet electricity needs while reducing emissions. Growth will be led by the Asia Pacific region, where the nuclear output is projected to rise from 3% of total energy in 2010 to close to 9% by 2040.

1.1.2.5 Standard Renewables

Renewable Energy supplies — including traditional Biomass, Hydro and Geothermal as well as Wind, Solar and Biofuels — will grow by close to 60%, led by increases in hydro, Wind and Solar. Wind, Solar and Biofuels are likely to make up about 4% of energy supplies in 2040, up from 1% in 2010. We foresee Wind and Solar providing about 10% of electricity generated in 2040, up from about 2% in 2010.

1.2 Environment

• Climate Change
• Water Supply
• Clean Air
• Land Pollution

1.2.1 Climate Change

The EPA states "Over the past century, human activities have released large amounts of Carbon Dioxide, Methane and other Greenhouse Gases into the atmosphere. The majority of greenhouse gases come from burning fossil fuels to produce energy, although deforestation, industrial processes, and some agricultural practices also emit gases into the atmosphere."
1.2.1.1 Climate Change Cause
The burning of fossil fuels has been affecting the earth’s climate. Greenhouse Gas Emissions i.e. Carbon Dioxide (CO\textsubscript{2}) and Methane (CH\textsubscript{4}) has been changing the earth’s environment by basely increasing the planet’s temperature. The increasing temperature has increased the ocean temperature affecting the weather. The climate is changing the weather extremes, colder, hotter, dryer, wetter, and stronger storms. Temperature zones are changing. This is because of burning fossil fuel for Transportation and Electricity Generation.

1.2.1.2 End Climate Change
They’re on way to stop the effects of Climate Change. We can only mitigate the effects by ending the sources of Climate Change.

End

• Burning fossil fuel in Transportation
• Burning fossil fuel in Electricity Generation

1.2.2 Water Supply
Clean Water is a finite resource in the World. We need clean water for drinking and farming. There are two ways that the Magnetic Renewable Generator can help with the water supply:

• End water use in Electricity Generation
• Filter water

1.2.2.1 Water in Electricity Generation
Water in Electricity Generation:

• Water converted to steam to turn a generator for Electricity Generation.
• Water to cool Nuclear Power

This limits the clean water supply required for drinking and farming. The Magnetic Renewable Generator will end the need for water in Electricity Generation.

1.2.2.2 Clean Water
The electricity produced by the Magnetic Renewable Generator can be used with water cleaning systems:

• Reverse Osmosis System
• Desalination System

The Magnetic Renewable Generator can reduce the electricity cost of using these systems.

1.2.3 Clean Air
Clean Air is a problem. There are many kinds of health problems caused by air pollution. The burning of fossil fuels and leaking of natural gas from fracking has impacted the air quality. The largest source of pollution is for Transportation, and Electricity Generation.

1.2.4 Land Pollution
Land Pollution from extracting fossil fuels has become a problem. Digging for coal and tar sand oil destroys the land. Leaking of oil from drilling and transporting has affected the land. The radioactive waste from nuclear power as affected the land. These problems are because of the need for fuels for Transportation and Electricity Generation.

1.3 Energy Expense
The unstable cost of fossil fuels, i.e., Oil (Gasoline, Diesel), Natural Gas and other fuel sources for Transportation and Electricity Generation has created uncertainty.

1.3.1 Electricity Cost
• Magnetic Renewable Generator $0.009
• Gas, Diesel, Natural Gas $0.10
• Wind Power $0.08
• Solar Power $0.22

1.3.2 Transportation Cost
• Magnetic Renewable Engine $0
• Gasoline $2.07/gallon*
• Diesel $2.30/gallon*
* Gasoline and Diesel cost the US average 2/2016

1.3.3 Example Energy Cost
The United State Government would have saved $2.5 billion in two years’ operations.

United State Government

*Federal Fleet Report 2011 Table 5-2 Trend: Fuel Cost by Fuel Type by Year
FedEx is an example of a company that would have saved $12 billion in three years of operations.
The solution to the World’s energy problem is to replace the combustion engine with the Magnetic Renewable System that will produce, Renewable Electric Transportation and Renewable Electricity Generation. The system is composed of the Electromagnetic Reciprocating Engine and an Electric Power Source.

The Magnetic Renewable System is an energy converter, built around using the crankshaft more efficient, a power stroke is ever $\frac{1}{5}$Stroke. The crankshaft uses Mechanical Advantage of Lever to increase the Output Force over the Input Force. The Input Force on the crankshaft is from the Magnetic Chamber. The Magnetic Chamber converts electricity into Magnetic Energy into the Force.

The Magnetic Chamber and the crankshaft together are the heart of the Magnetic Renewable System. The Magnetic Chamber starts the Force and the crankshaft amplifies that Force. All the engine subsystems are designed to support them.

The Electric Power Source uses two sources of electricity to power the Electromagnetic Reciprocating Engine. Stored Electrical Energy from a battery to start the engine. Electricity generation systems that are turned by the crankshaft for electricity.

### 2.1 Magnetic Chamber

The Magnetic Chamber is the Phase I of a three phase energy conversion system. The Magnetic Chamber uses Magnetic Energy from an electromagnet to convert Electrical Energy to Kinetic Energy, Force.

The Magnetic Chamber uses the Magnetic Force from an Opposite Pole Electromagnet and Permanent Magnet repelling and attracting to each other to turn the crankshaft. The Magnetic Forces used to turn the crankshaft are using the principle of magnets with the same poles will repel and that magnets with opposite poles will attract with equal Force. Newton’s Third Law of Motion, “For every action, there is an equal and opposite reaction.” The key is to use an Opposite Pole Electromagnet, powered by electricity, which can change poles by changing polarity.

Place a Permanent Magnet at either end of the Opposite Pole Electromagnet. Mount the Permanent Magnets on a movable frame that moves in a linear motion connected to the crankshaft, which moves in a rotational motion.

The position of the Permanent Magnets to the Opposite Pole Electromagnet will set the timing of the Magnetic Forces. The Permanent Magnets have two positions, Top Dead Center (TDC) and Bottom Dead Center (BDC). These positions are when the Permanent Magnet is close to the Opposite Pole Electromagnet. A Rotational Position Sensor on the crankshaft monitors these positions. The movement from TDC to BDC is a $\frac{1}{5}$Stroke of the crankshaft.

### TDC

Top Permanent Magnet (TPM) is set with the North Pole facing the Opposite Pole Electromagnet. Electricity is applied, 1-degree pass TDC, to the Opposite Pole Electromagnet with the polarity set to the North Pole. The electricity is off once the TPM is 10 degrees pass TDC. The Magnetic Force moves the Frame. The Frame connected to the crankshaft. Move to the Top Permanent Magnet closer to the Opposite Pole Electromagnet.

### BDC

Bottom Permanent Magnet (BPM) is set with the South Pole facing the Opposite Pole Electromagnet. Electricity is applied, 1-degree pass BDC, to the Opposite Pole Electromagnet with the polarity set to the South Pole. The electricity is off once the BPM is 10 degrees pass BDC. The Magnetic Force moves the Frame. The Frame connected to the crankshaft. Move to the Top Permanent Magnet closer to the Opposite Pole Electromagnet.

The amount of Magnetic Force is calculated from the combustion process, That Force is the same pressure from the combustion process, pushing down on the piston. The Mean Effective Pressure is the formula to calculate the pressure.
The Mean Effective Pressure is an abstraction of the pressure exerted into the combustion chamber of an internal combustion engine. Mean Effective Pressure is abbreviated MEP. It is calculated by taking the torque exerted by the engine over a revolution for a 2-stroke engine and two revolutions for a 4-stroke, and dividing it by its displacement, in SI units, for MEP in Pascal. The number of strokes that is used is 0.5-stroke.

\[
\text{Mean Effective Pressure} \quad 0.5 - \frac{1}{2} \text{ Stroke} \\
\text{MEP} = \frac{0.5\pi T}{V} \\
\text{MEP} = (0.5\pi)(T \text{Nm})/(V \text{m}^3) = \text{N/m}^2 \text{ or Pa}
\]

2.2 Crankshaft

The Crankshaft is the Phase II of a three phase energy conversion system. The Crankshaft converts linear motion into circular motion. It takes the Kinetic Energy, Force, from the Magnetic Chamber and accesses the Potential Energy in the crankshaft.

2.2.1 Potential Energy in Crankshaft

The Crankshaft has a large amount of Potential Energy that can be accessed by two variations, the stroke number and the stroke distance (crank). The Stroke Number sets the Input Energy. The smaller the distance, the revolution, between energy transferred, power strokes. The smaller the amount of energy is required. The stroke distance sets the amount of energy that can be accessed, increasing the Output Energy. The Law Of Lever is used to understand the amount of energy. The longer the stroke distance, crank, the more energy is accessed.

2.2.2 Mechanical Advantage of Lever

The Crankshaft Ideal Mechanical Advantage of Lever (IMA) can be used to calculate the mechanical advantage of the crank of the crankshaft. The crank has two forces, Input Force from the Magnetic Chamber and the Output Force to the shaft of the crankshaft. The length of the crank and the radius of the shaft is multiplied by the Input Force. The answer is the Crankshaft Output Force. The IMA is used to find the Input Force (\(F_C\)) and Output Force (\(F_S\)) of the crankshaft.

\[
IMA = \frac{L_C}{L_S} \\
IMA \times F_C = F_S \\
F_C = \text{Force from Magnetic Chamber} \\
F_S = \text{Force of shaft of the crankshaft}
\]

Mechanical Advantage

The Mechanical Advantage of a crank, the ratio between the Force on the connecting rod and the torque on the shaft, varies throughout the crank’s cycle. Mechanical Advantage is a measure of the Force amplification achieved by using a tool, mechanical device or machine system. The device preserves the Input Force and simply trades off the forces against movement to obtain a desired amplification in the Output Force. The model for this is the Law Of The Lever.

Law Of The Lever

Archimedes using geometric reasoning proved the Law of the Lever. It shows that if the distance A from the fulcrum to where the Input Force is applied (point A) is greater than the distance B from the fulcrum to where the Output Force is applied (point B), then the Lever amplifies the Input Force. If the distance from the fulcrum to the Input Force is less than from the fulcrum to the Output Force, then the Lever reduces the Input Force.

Mechanical Advantage of Lever

2.2.3 .5 Stroke

The Stroke of the Crankshaft means it applies power to the crankshaft at a half, 0.5-stroke, a revolution.

2.2.4 Input Force

The Input Force on the crankshaft is from the Magnetic Chamber. The Force is set by the MEP formula, the weight of the Magnetic Chamber and 20% of the Force.
2.2.5 Output Force

The Output Force is the force of the shaft of the crankshaft. That force, Kinetic Energy is used to turn produce Transportation or Electricity Generation.

2.2.6 Compare Combustion Engine

The crankshaft in the Magnetic Renewable System is based on the crankshaft from the combustion engine, Distance of Stroke and the Force required.

2.2.6.1 Horsepower Increase

The Magnetic Renewable System turns the crankshaft a .5 Stroke. This change in strokes will increase the horsepower compared to the standard 4 Strokes.

The increase in horsepower is due to the change of Time it takes to turn the crank before the power stroke. The definition of the horsepower is HP = Force x Distance/Time, using 4 Strokes, every 4th stroke is a power stroke, that means that three strokes are not being used. An increase in efficiency is possible if the number of power strokes is increased per revolution. Decreasing the number of strokes from 4 Strokes to a .5 Stroke.

The example of a 300 horsepower combustion engine, the power per revolution increased from 1,250 RPMs to 10,000 RPM’s, an increase in horsepower by 88%.

<table>
<thead>
<tr>
<th># Strokes</th>
<th>Formula</th>
<th>Power Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-stroke</td>
<td>4/5000</td>
<td>1,250</td>
</tr>
<tr>
<td>2-stroke</td>
<td>2/5000</td>
<td>2,500</td>
</tr>
<tr>
<td>1-stroke</td>
<td>1/5000</td>
<td>5,000</td>
</tr>
<tr>
<td>.5-stroke</td>
<td>5/10,000</td>
<td>10,000</td>
</tr>
</tbody>
</table>

2.2.6.2 Stroke Decrease

The Magnetic Renewable System turns the Crankshaft a .5 Stroke before producing power. The decrease in strokes requires a decrease in energy, Input Force, required by the crankshaft is because the number of strokes has decreased compared to the combustion engine. The .5 Stroke requires less Input Force because the Distances it travels is less than in the combustion engine. This smaller distance decreases the time it takes to turn the crankshaft. This small distance decreases the amount of Input Force that is required to turn the crank.

<table>
<thead>
<tr>
<th># Strokes</th>
<th>Force</th>
<th>Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-stroke</td>
<td>1,495</td>
<td>IC</td>
</tr>
<tr>
<td>2-stroke</td>
<td>747</td>
<td>50%</td>
</tr>
<tr>
<td>1-stroke</td>
<td>374</td>
<td>75%</td>
</tr>
<tr>
<td>.5-stroke</td>
<td>187</td>
<td>87%</td>
</tr>
</tbody>
</table>

2.2.6.3 Less Power Consumption

The Magnetic Renewable System turns the crankshaft a .5 Stroke. This small Distance decreases the Time it takes to turn the crank. This small Distance decreases the amount of Input Force that is required to turn the crank. This decrease will increase the horsepower that the engine will produce.

2.2.7 Compare Electric Motor

An Electric Motor is an electrical machine that converts Electrical Energy into Kinetic Energy. Most electric motors operate through the interaction between the motor’s magnetic field and winding currents to generate force in the form of rotation. Electric motors can be powered by direct current (DC) sources, such as from batteries, motor vehicles or rectifiers, or by alternating current (AC) sources, such as a power grid, inverters or electrical generators. An electric generator is mechanically identical to an electric motor, but operates in the reverse direction, accepting Kinetic Energy converting this Kinetic Energy into Electrical Energy.

Electric Motors may be classified by considerations such as power source type, internal construction, application and type of motion output. In addition to AC versus DC types, motors may be brushed or brushless, may be of various phases (see single-phase, two-phase, or three-phase), and may be either air-cooled or liquid-cooled. General-purpose motors with standard dimensions and characteristics provide convenient mechanical power for industrial use. The largest electric motors are used for ship propulsion, pipeline compression and pumped-storage applications with ratings reaching 100 megawatts. Electric motors are found in industrial fans, blowers and pumps, machine tools, household appliances, power tools and disk drives. Smaller motors may be found in electric watches.

2.2.7.1 Crankshaft vs. Shaft

The Crankshaft is more efficient than the Shaft in converting energy into horsepower. The Shaft, used in the electric motor, is the most efficient way of converting energy into motion, RPM’s, but not producing torque. The difference is in the understanding of horsepower and torque.

The Shaft turned by a motor is efficient at producing rpm’s. “Rotational speed (or speed of revolution) of an object rotating around an axis is the number of turns of
the object divided by time, specified as revolutions per minute (RPM), revolutions per second (rev/s), or radians per second (rad/s) [3]. It is not efficient at producing torque.

“Torque is a measure of how much Force acting on an object causes that object to rotate. The object rotates about an axis, which we will call the pivot point. The distance from the pivot point to the point where the force acts are called the moment arm,” [4]. The longer the moment arm (crank) the more Force produced.

Horsepower is the combination of RPM’s and torque. Horsepower defined as Force (torque) x Distance (crank) / Time (RPM). Force is the amount of energy it takes to turn a crank around a center point. Distance is the length of the crank from the center point. Time is how long it takes to turn that crank. The longer the distance, the more Force is produced. The higher the RPM’s the more torque will be produced. The objective of an engine is to convert energy into torque.

The Crankshaft and the Shaft are similar in that they both turn around a center point. The difference is the Distance from that center point. The longer the Distance from the center point, the less amount of Force is required to produce horsepower. The Crankshaft has a longer crank than the Shaft.

2.2.7.2 Energy Required

Comparing the Crankshaft to the Shaft is not common because of the different fuels they use. The standard Crankshaft used fossil fuels and the Shaft used electricity. The Electromagnetic Reciprocating Engine uses electricity.

300 Horsepower Engine
• 223,800 watts – 300 HP Electric Motor
• 83,000 watts – 548 HP Mag Engine

The Crankshaft used in the Electromagnetic Reciprocating Engine is 63% more efficient than the Shaft used in the electric motor in producing horsepower. This will change the formula from 1HP = 746 to 1HP = 1,215.5 watts.

2.2.8 Efficiency

Efficiency is the ratio between power output (mechanical) and power input (electrical). Mechanical power output is calculated based on the torque and speed required (i.e. power required to move the object attached to the motor), and electrical power input is calculated based on voltage and current supplied to the motor. Mechanical power output is always lower than the electrical power input, as energy is lost during conversion (electrical to mechanical) in various forms, such as heat and friction.

2.2.8.1 Shaft in Electric Motor

Electrical Motor Efficiency in Percentage

If power output is measured in percentage then efficiency can be expressed as:

\[
N_m = \frac{P_{out}}{P_{in}} \times 100\%
\]

where
\[
\eta_m = \text{Motor efficiency}
\]
\[
P_{out} = \text{Shaft Mechanical Power Output}
\]
\[
P_{in} = \text{Electrical Power Input}
\]

Electrical Motor Efficiency in Watt

If power output is measured in Watt (W) then efficiency can be expressed as:

\[
N_m = \frac{P_{out}}{P_{in}}
\]

where
\[
\eta_m = \text{Motor efficiency}
\]
\[
P_{out} = \text{Shaft Mechanical Power Output}
\]
\[
P_{in} = \text{Electrical Power Input}
\]

Electrical Motor Efficiency in Horsepower

If power output is measured in horsepower (HP), efficiency can be expressed as:

\[
N_m = \frac{P_{out} \times 746}{P_{in}}
\]

where
\[
\eta_m = \text{Motor efficiency}
\]
\[
P_{out} = \text{Shaft Mechanical Power Output}
\]
\[
P_{in} = \text{Electrical Power Input}
\]

Thus, a motor that is 85% efficient converts 85% of the electrical energy input into mechanical energy. The remaining 15% of the electrical energy is dissipated as heat, evidenced by a rise in motor temperature. Energy efficient electric motors utilize improved motor design and high quality materials to reduce motor losses, therefore improving motor efficiency. The improved design results in less heat dissipation and reduced noise output.

2.2.8.2 Crankshaft in Magnetic Engine

Combustion Engine Efficiency in Percentage

The efficiency of the combustion engine is talked about in fuel efficiency. This is because the number of strokes used to turn the crankshaft is set to 4 strokes. 4 strokes...
are the most efficient number of strokes used for the combustion process.

**Magnetic Engine Output in Percentage**

The efficiency of the magnetic engine is in the number of strokes of the crankshaft. The lower number of strokes, the more efficient the engine.

**2.2.8.3 Magnetic Engine Compare to Electric Engine**

The comparison of the electric motor to the magnetic engine is comparing the shaft to the crankshaft. The problem is “what is being compared?”. The efficiency of RPMs or efficiency of torque. The electric motor is very efficient at converting energy into RPMs. The magnetic engine is very efficient at converting energy into torque.

The comparison depends on the job that is required and the scale that is used. Using the scale of horsepower, the magnetic engine is more efficient. It produces more work for less energy than the electric motor. The electric motor has access all its Potential Energy. The magnetic engine has more Potential Energy to access just by changing the strokes, the more Potential Energy accessed the more efficient.

**2.3 Electrical Power Source**

The **Electrical Power System** is the Electrical Energy source for the Magnetic Renewable System. The system, does not create energy, it uses stored energy and/or converts Kinetic Energy into Electrical Energy.

The Alternator/Generator is Phase III of a three phase System. They convert Kinetic Energy from the crankshaft to Electrical Energy.

**Electrical Power System**

- Battery Bank
- Battery Bank – Alternator
- Battery Bank – Generator-head

**2.3.1 Battery Bank**

The **Battery Bank** will store electricity. The Battery Bank used in two forms, battery only or battery supported by the alternator or generator. The battery only will provide maximum torque for the Electromagnetic Reciprocating Engine. The Battery Bank only will need to charge from an outside electrical source.

An Electric Battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal. When a battery is connected to an external electric load, a redox reaction converts high-energy reactants to lower-energy products, and the free-energy difference is delivered to the external circuit as Electrical Energy.

**2.3.2 Battery Bank – Alternator**

The **Battery Bank – Alternator** will store and convert electricity. The Battery Bank will store electricity to start the engine. The alternator will convert part of the Kinetic Energy to Electrical Energy for the Electromagnetic Reciprocating Engine producing Renewable Electric Transportation.

Electric Alternators/Generators transform Kinetic Energy into Electrical Energy. This is the most used form for generating electricity and is based on Faraday’s Law. It can be seen experimentally by rotating a magnet within closed loops of a conducting material (e.g. copper wire). Almost all commercial electrical generation is done using electromagnetic induction, in which Kinetic Energy Forces a generator to rotate.

**2.3.3 Battery Bank – Generator-head**

The **Battery Bank – Generator-head** will store and convert electricity. The Battery Bank will store electricity to start the engine. The Generator-head will convert the Kinetic Energy to Electrical Energy for the Electromagnetic Reciprocating Engine producing Renewable Electricity Generation.

Electric Alternators/Generators transform Kinetic Energy into Electrical Energy. This is the most used form for generating electricity and is based on Faraday’s Law. It can be seen experimentally by rotating a magnet within closed loops of a conducting material (e.g. copper wire). Almost all commercial electrical generation is done using electromagnetic induction, in which mechanical energy forces a generator to rotate.
2.4 Renewable Energy

The Magnetic Renewable System is a renewable energy conversion system. Energy conversion, is the process of changing energy from one of its forms into another. In physics, energy is a quantity that provides the capacity to perform work — think of lifting an object. In addition to being converted, and also according to the Law Of Conservation Of Energy, energy is transferable to a different location or object, but it cannot be created or destroyed.

The Magnetic Renewable System converts Electrical Energy to Kinetic Energy to Electrical Energy. The increase in output over input is done by accessing the Potential Energy in the crankshaft of Kinetic Energy.

Renewable Energy Conversion Process

2.4.1 Converting Energy

The Magnetic Renewable System converts energy from Magnetic Energy to Kinetic Energy to Electrical Energy. This conversion is not a 1 to 1 conversion, one kinetic form of energy does not equal to one electrical form of energy. The Electromagnetic Reciprocating Engine uses a 1 HP = 1,215 watts. The Magnetic Renewable System subtracts 151 watts for the electromagnets. That leaves 1,064 watts of electricity of Renewable Energy.

2.4.2 Energy Requirements

The Magnetic Renewable System requires energy, Electrical Energy, to operate. The system converts Electrical Energy into Kinetic Energy or Force. That Force can be converted into Electrical Energy by turning an alternator or generator. That turning requires 30% of the Force. The remaining Force, 70%, can be used for Transportation or Electricity Generation.

2.4.3 Example

An example of the Magnetic Renewable System configured as a Magnetic Renewable Engine and Magnetic Renewable Generator. This engine produces 5,200 standard horsepower. The engine is powered by an Alternator with requires 1,560 horsepower. This leaves 3,640 horsepower for work.

| Magnetic Renewable System Mag Power V8-5,462 013A-PLV8-5,462 |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| HP | kW | HP | kW |
| 5,000 RPM | 10,000 RPM | 5,000 RPM | 10,000 RPM |
| Renewable | 3,640 | 4,425 | 7,280 | 8,849 |
| Battery | 5,200 | 6,321 | 10,400 | 12,642 |
| Torque@1,300 | 5,462 | 7,407 | Nm |
| Chamber # | 8 |
| Stroke Distance | 4,16 | IN | 105.66 | MM |
| Crankshaft Input Force | 227 | LBS. | 985 | N |
| Crankshaft Output Force | 3,901 | LBS. | 17,351 | N |

2.5 System Physic

The Magnetic Renewable System is built around the law of physics. But the Magnetic Renewable System will challenge the understanding of physics and end some assumptions.

2.5.1 Energy

“The total energy of a system can be subdivided and classified into Potential Energy, Kinetic Energy, or combinations of the two in various ways. Kinetic Energy is determined by the movement of an object – or the composite motion of the components of an object – and Potential Energy reflects the potential of an object to have motion, and generally is a function of the position of an object within a field or may be stored in the field itself.”

“While these two categories are sufficient to describe all forms of energy, it is often convenient to refer to particular combinations of Potential Energy and Kinetic Energy as its own form. For example, macroscopic Kinetic Energy is the sum of translational and rotational Kinetic Energy and Potential Energy in a system.”


Electrical Energy may be either Potential Energy or Kinetic Energy, but it’s usually encountered as Potential Energy, which is energy stored due to the relative positions of charged particles or electric fields.

2.5.2 Assumptions

Create Energy

It is assumed that the Magnetic Renewable System creates energy. It does not create energy following the
Law of Conservation of Energy. It is an energy converter that primarily converts Kinetic Energy into Electrical Energy. But it accesses Potential Energy stored in the crankshaft to increase the energy output.

The Law Of Conservation Of Energy states that the total energy of an Isolated System remains constant; it is said to be conserved over time.

For instance, chemical energy is converted to kinetic energy when a stick of dynamite explodes. If one adds up all the forms of energy that were released in the explosion, such as the Kinetic Energy and Potential Energy of the pieces, as well as heat and sound, one will get the exact decrease of chemical energy in the combustion of the dynamite.

The question is, “How is the crankshaft amplifying force without creating energy?” The crankshaft is not creating energy, it is accessing the Potential Energy by changing the strokes.

Laws Of Thermodynamics

It is assumed that the Magnetic Renewable System is governed by the Laws Of Thermodynamics. The Law of Thermodynamics does not include Kinetic Energy or Potential Energy. That is the type of energy used in the Magnetic Renewable System.

“In thermodynamics, the internal energy of a system is the total energy contained within the system. It is the energy necessary to create or prepare the system in any given state, but does not include the Kinetic Energy of motion of the system as a whole, nor the Potential Energy of the system as a whole due to external force fields which includes the energy of displacement of the system’s surroundings. It keeps account of the gains and losses of energy of the system that are due to changes in its internal state.”

https://en.wikipedia.org/wiki/Internal_energy

Perpetual Motion Machine

It is assumed that the Magnetic Renewable System is not a Perpetual Motion Machine. A Perpetual Motion Machine is motion of bodies that continues indefinitely. A Perpetual Motion Machine is a hypothetical machine that can do work indefinitely without an energy source. This kind of machine is impossible, as it would violate the First or Second Law Of Thermodynamics.

The Magnetic Renewable System is a Perpetual Motion Machine. It changes the understanding of a perpetual motion. It has an energy source, Potential Energy accessed by the crankshaft. It is not governed by the Law Of Thermodynamics. Because the Law of Thermodynamics does not include Kinetic Energy or Potential Energy.

The Magnetic Renewable System does not operate at 100% efficiency. It changes the efficiency scale of the crankshaft by understanding the changing the strokes.

The Magnetic Renewable System has energy dissipation. But because the amount of Potential Energy accessed from the crankshaft is more that cover any energy lost.

2.5.3 Physic of Subsystems

The Magnetic Renewable System is divided into three systems each based on different laws of physics; Magnetic Chamber, Crankshaft, and Electric Source.

Magnetic Chamber Physic

The Magnetic Chamber uses magnetic forces to move the crankshaft. That force converts electricity into Kinetic Energy.

- Lorentz Force Law – In physics (specifically in electromagnetism) the Lorentz force (or electromagnetic force) is the combination of electric and magnetic force on a point charge due to electromagnetic fields. The Lorentz Force is the magnetic force of the electromagnetic.
- Newton's Third Law of Motion – states, "For every action, there is an equal and opposite reaction." This law describes what happens to a body when it exerts a force on another body. Forces always occur in pairs, so when one body pushes against another, the second body pushes back just as hard. The mutual forces of action and reaction between two bodies are equal. The force between the electromagnet and the permeant magnet.
- Coulomb’s Law – states that "like charges repel, and unlike charges attract," but the more complete form determines the strength of the Coulomb force; Coulomb's Law shows how strong the push or pull (the force) is between two points of charge. The amount of force between the electromagnet and the permeant magnet.

Crankshaft Physic

The Crankshaft does two thinks, converts the linear motion of the Magnetic Chamber into motion and access Potential Energy.

- Newton’s 2nd Law: Rotation – The relationship between the net external torque and the angular acceleration is of the same form as Newton’s second law and is sometimes called Newton’s second law for rotation. It is not as general a relationship as the linear one because the moment of inertia is not strictly a scalar quantity. The rotational equation is
limited to rotation about a single principal axis, which in simple cases is an axis of symmetry.

- **Law Mechanical Advantage Of The Lever** – Mechanical Advantage is a measure of the force amplification achieved by using a tool, mechanical device or machine system. The device preserves the input power and simply trades off forces against movement to obtain a desired amplification in the output force. A lever amplifies an input force to provide a greater output force, which is said to provide leverage. The ratio of the output force to the input force is the Mechanical Advantage Of The Lever.

**Electric Source Physic**

The Electricity Source converts the motion of the crankshaft into electricity.

- **Coulomb's Law** – states that "like charges repel, and unlike charges attract," but the more complete form determines the strength of the Coulomb force; Coulomb's Law shows how strong the push or pull (the force) is between two points of charge.

- **Newton's 2nd Law: Rotation** – The relationship between the net external torque and the angular acceleration is of the same form as Newton's second law and is sometimes called Newton's second law for rotation. It is not as general a relationship as the linear one because the moment of inertia is not strictly a scalar quantity. The rotational equation is limited to rotation about a single principal axis, which in simple cases is an axis of symmetry.

- **Faraday's Law Of Induction** (briefly, Faraday's law) – a basic law of electromagnetism predicting how a magnetic field will interact with an electric circuit to produce an electromotive force (EMF)—a phenomenon called electromagnetic induction. It is the fundamental operating principle of transformers, inductors, and many types of electrical motors, generators and solenoids.
III Technology
System Components

The Magnetic Renewable System main system is the Magnetic Chamber. The engine subsystems are designed to support the Magnetic Chamber.

3.1 Magnetic Chamber

The Magnetic Chamber is composed of one Opposite Pole Electromagnet, two Permanent Magnets, three Magnetic Frame Rails, and two Frame Plates.

The Opposite Pole Electromagnet mounts on the engine block, placing in the middle of the Frame Plate. The Permanent Magnets on the Frame Plate line up at either end of the Electromagnet. The Magnetic Force from the Electromagnet and the Permanent Magnet repelling and attracting will move the Frame Plate, connected, to the Connecting Rod, connected to the Crankshaft. The Crankshaft supported by Pillow Bearings mounted to the engine block.

3.2 Crankshaft System

The Crankshaft System is the crankshaft and the supporting parts.

Components
- Crankshaft
- Flywheel
- Crankshaft Bearing
- Connecting Rod Bearing
- Ball Bearing Connecting Rod

3.2.1 Crankshaft

A Crankshaft is a mechanical part able to perform a conversion between reciprocating motion and rotational motion. In a reciprocating engine, it translates reciprocating motion of the piston into rotational motion. In order to do the conversion between two motions, the crankshaft has "crank throws" or "crankpins", additional bearing surfaces whose axis is offset from that of the crank. The crank is connected to the Ball Bearing Connecting Rods from each Magnetic Chamber attach.

3.2.2 Crankshaft Support Bearings

The Crankshaft Support Bearings connect the Crankshaft to the engine block. Ball Bearings will support the Crankshaft.

Ball Bearings

The Ball Bearings support is a bearing pillow block mounted on the engine block supporting the Crankshaft. A pillow block bearing consists of a bearing situated inside of a mounting bracket, which is also its housing.

3.2.3 Ball Bearing Connecting Rod

The Ball Bearing Connecting Rod connects the Magnetic Chamber to the Crankshaft. The Ball Bearing Connecting Rod compose from aluminum and Connecting Rod Bearings. The housing connects to an automatic lubricating system for the bearings.
3.2.4 Flywheel
The Flywheel is composed of mild steel and converts reciprocating energy into rotational energy. It regulates the engine’s rotation, making it operate at a steady speed. Flywheels have a significant moment of inertia and thus resist changes its rotational speed. The amount of energy stored in a Flywheel is proportional to the square of its rotational speed. The energy transferred to the flywheel by applying torque.

3.2.5 Harmonic Balancer / Damper
A Harmonic Balancer (also called crank pulley damper, Crankshaft damper, torsional damper, or vibration damper) is a device connected to the Crankshaft of an engine to reduce torsional vibration.

The Harmonic Balancer will be designed around 20,000 rpm’s. The RPMs limits set by the maximum magnetic FORCEs produce from the Magnetic Chamber.

3.3 Bearing System
The Magnetic Renewable System uses a hybrid bearing system. The hybrid bearing system uses linear and rotary bearings, which are composed of magnetic, and ball bearings. Linear bearings, Passive Magnetic Linear Bearing, used in the Magnetic Chamber. Rotational bearing ball bearing used in the Crankshaft System. The ball bearings used in the Connecting Rod with an external lubricating system.

Bearing Benefits
• Ball Bearings – light weight

3.3.1 Magnetic Linear Bearings
The Passive Magnetic Linear Bearings is the Magnetic Guide Rail for the Magnetic Chamber. It guides the Magnetic Chamber through the engine block and it connects the top and bottom magnet plates. The Passive Magnetic Linear Bearings are designed to use the Magnetic Forces to align the Magnetic Shaft in the middle of the Magnetic Ring. The Magnetic Shaft and Magnetic Ring are composed of radially ring neodymium magnets. The magnets are configured as a Uni-pole Radial [3]. The Magnetic Shaft is inserted into the middle Magnetic Ring with the opposite poles facing each other. The Magnetic Shaft has a titanium Shaft through the middle that connects the top and bottom plates.

3.3.2 Ball Bearings
Ball Bearings are part of the Connecting Rod and the Crankshaft Support Bearings.

Ball Bearing Connecting Rod
The Ball Bearings Connecting Rod are part of the Connecting Rod Bearings. It allows the parts to move at high RPMs. The Ball Bearings will require lubrication.

Ball Bearing Crankshaft Support
The Ball Bearings Crankshaft Support is part of the Crankshaft Support Bearings. The Ball Bearings mounted in a pillow block bearing, flange-bearing units, and take-up bearing units all consist of a housing with a bearing mounted in the housing and lubricated by the Ball Bearing Lubrication System.

3.3.3 Bearings Lubrication System
The Bearing Lubrication System is an Automatic Lubrication System (ALS) that delivers controlled amounts of lubricant to multiple locations on the Connecting Rod Bearings and Crankshaft Bearings while operating.

It will use the parallel type system, lubricant flows from the pump through a single supply line to multiple branches of injectors. The injectors operate simultaneously, but are independent of each other. Each injector serves only one lubricant point and may be accurately adjusted to deliver the precise amount of lubricant or oil required. The nature of a parallel type system is such that only main line pressure is monitored, so if any feed line or bearing is not taking lubricant, the remainder of the system will continue to function normally.

Components
• Electric Pump – controlled by the ECU
• Fluid Pressure Sensor – controlled by the ECU
• Oil Reservoir
• Injectors
• Fluid Temperature Sensor
• Enclosure Temperature Sensor
• Electric Heat Nozzle
• Automatic Louvers & Fan
Ball Bearing Nano Lubricate

NanoProMT performs in extreme industries and applications, including heavy-wear machinery and hardware. With extended use over time and prolonged exposure to high heat, standard lubricants break down and stop protecting. However, our specially engineered nanoparticles eliminate these problems, delivering superior penetration for complete coverage that protects longer without altering any dimensional surface tolerance.

Formulated with specially engineered nanoparticles, NanoProMT’s advanced products penetrate deeper, to lubricate where it counts — at the metal-to-metal interface, at the Nano level.

No other lubricants protect as completely because no other lubricants can penetrate to the Nano level where friction, heat, wear and corrosion occur.

Temperature Management Unit

The Temperature Management Unit maintains the temperature of the electromagnet. The electromagnet produces heat during operation. It has an operating range for 14°F (-10°C) to 104°F (40°C) and the system will keep the electromagnet within that operational range. The heat from the electromagnet and the outside temperature affects the temperature of the electromagnet. The system is designed to add heat to the Manifold Fluid on cold days and to subtract heat from the Manifold Fluid on hot days.

The heart of the Temperature Control System is the Temperature Manifold, which is controlled by the ECU. The Temperature Manifold will control the Manifold Fluid by using Temperature Sensors at select positions on the Temperature Manifold. It uses Electric Fluid Pumps and electric valves to move the fluid to various parts of the Temperature Manifold and around the electromagnet.

Temperature System

The Temperature Control System controls the temperature of the electromagnet. The electromagnet produces heat during operation. It has an operating range for 14°F (-10°C) to 104°F (40°C) and the system will keep the electromagnet within that operational range. The heat from the electromagnet and the outside temperature affects the temperature of the electromagnet. The system is designed to add heat to the Manifold Fluid on cold days and to subtract heat from the Manifold Fluid on hot days.

The Temperature Control System is divided into the Cooling System and the Heating System. The Cooling System is designed to remove heat from the electromagnets. The Heating System is designed to add heat to the electromagnet.

3.4 Temperature Manifold

The Temperature Control System is built on the Temperature Manifold. The Temperature Manifold has a valve chamber at the one end, which the Electric Valves are mounted. And it has two large tubes: Inlet and Outlet.

The Inlet tube brings Manifold Fluid to the electromagnet. It is at the bottom of the Temperature Manifold. It has the Temperature Control Tube and has a Temperature Sensor at either end. The Temperature Sensors will measure the manifold fluid temperature before and after the Temperature Control Tube.

The Outlet tube removes Manifold Fluid from the electromagnet. It is at the top of the Temperature Manifold with a Temperature Sensor at the end to
measure the temperature of the Manifold Fluid leaving the electromagnet.

Components
- Temperature Sensor
- Fluid Meter Sensor
- Electric Fluid Value
- Electric Fluid Pump
- Temperature Control Tube

Manifold Coatings
- Anodized Aluminum – All
- Thermal Spray Insulation – Outside

Manifold Fluid
The Manifold Fluid is a waterless engine coolant. Evans Waterless Heavy Duty Coolant can control metal temperatures at coolant temperatures that are well above the boiling point of water.

Waterless Coolant
- Operating Range - 40°F to 375°F
- Without Water, No Corrosion & No Boiling

Temperature Sensor
The Temperature Sensors are used to monitor the coolant temperatures at different places in the Temperature Manifold and the outside. The information is used to control the temperature of the electromagnet. There are three Temperature Sensors in the Temperature Manifold and one placed outside the engine. The Temperature Sensors connect to the ECU.

- Sensor 1 – Entering The Manifold
- Sensor 2 – After Temperature Control Tube
- Sensor 3 – Exiting The Electromagnet
- Sensor 4 – Outside Temperature
- Sensor 5 – Radiator Air Temperature
- Sensor 6 – Reservoir Temperature

Fluid Meter Sensor
The Fluid Meter Sensor will monitor the rate the Cooling-Heating Fluid moves through the Temperature Manifold. The information is used to set the speed of the Electric Fluid Pump. The Temperature Manifold has one Fluid Meter Sensor. The Fluid Meter Sensor is connected to the ECU.

Electric Fluid Valves
The Electric Fluid Valves are used to control the Cooling-Heating Fluid to the radiator or to bypass the radiator. The valve settings are based on the temperature of the electromagnet. The Temperature Manifold has two electric valves: Outlet Valve and Inlet Valve. The valves are controlled by the ECU.

Electric Fluid Pump
The Electric Fluid Pump will move the Manifold Fluid through the Temperature Manifold. The Electric Fluid Pump is a water pump that is mounted on the Temperature Manifold. The Electric Fluid Pump is controlled by the ECU through the Heating Control Module.

Temperature Control Tube
The Temperature Control Tube is a copper tube that mounts to the inlet manifold. The AC Cooling Coil and Electric Heating Coil wrap around the tube. The tube will apply the needed temperature to the Manifold Fluid.

Reservoir
The Reservoir is insulated anodized aluminum tank. The fluid level and temperature will be monitored by the ECU.

Components
- Aluminum Tank
- Fluid Level Sensor
- Temperature Sensor

3.4.2 Cooling System
The Cooling System is designed to remove heat from the Manifold Fluid using two modes, Radiator Module and AC Module.

Radiator Module
The Radiator Module is used to cool the temperature of the Manifold Fluid through the radiator to operation range. The radiator is a heat exchanger used to transfer thermal energy from Manifold Fluid to the air for cooling. The fan moves air through the radiator to increase the heat exchange into the air.

Components
- Radiator
- Electric Fan
- Electric Louver
- Air Temperature Sensor

AC Module
The AC Module is designed to remove heat once the temperature reaches temperatures above operational range. It uses AC Coolant to remove heat once the standard coolant cannot.
Components

- AC Condenser
- AC Manifold
- AC Cooling Coil
- AC Receiver Dryer
- AC Expansion Valve
- AC Electric Compressor
- Temperatures
- Lubrication
- Electricity Levels
- Starting System
- Battery Levels
- Heating or Cooling
- Torque Output
- Lubrication Levels
- Alternator Output
- Battery Levels
- Generator Output

AC Cooling Coil

The AC Cooling Coil is a copper coil around the Temperature Control Tube. The AC Cooling Coil connects to an AC System. The AC Cooling Coil is designed to lower the temperature of the Manifold Fluid to operation range. The AC Cooling Coil is used only if the radiator cannot cool the engine. The AC System controlled by the ECU through the AC Cooling Control Module.

3.4.3 Heating System

The Heating System is designed to add heat to the Manifold Fluid.

Components

- Electric Heating Coil

Electric Heating Coil

The Electric Heating Coil is an Electric Nozzle Heater. The heater is used to increase the Manifold Fluid temperature in operation range. The nozzle is around the Temperature Control Tube. The heater is controlled by the ECU through the Fluid Pump Control Module.

3.5 Electrical System

The Electrical System is designed to manage the engine systems and manage the electricity. The engine systems (12VDC) and the electromagnet voltages (12V, 24V, 36V, 48V) which depend on the engine Magnetic Force requirements divide the engine voltage.

3.5.1 Engine Management

The Engine Management controls the engine systems. The engine systems: Magnetic Chamber, Crankshaft System, Bearing System, and Temperature Control System. The engine systems will be monitored and controlled by the Engine Control Unit (ECU).

3.5.1.1 Engine Control Unit (ECU)

The Engine Control Unit (ECU) is a microcontroller that controls the electrical systems and all the engine systems.

Monitors & Controls

- Magnetic Force
- Magnet Polarity
- Engine Timing

Display

- RPM’s
- Engine Temp

Magnetic Force Control

The Magnetic Force Control is part of the ECU. It sets Power Controller amperage level depending on the magnetic forces required from the electromagnet.

Engine Timing

The Engine Timing is set by the position of the permanent magnets to the electromagnet. The Absolute Rotary Position Sensor mounted on the Crankshaft monitors that position.

Power Levels

The ECU will monitor the power levels of the Power Plant, Battery Bank, and 12VDC Battery. Once the Power levels are below a set level, the ECU will start the appropriate charging; Battery Bank Charging or 12VDC Charging. The ECU can start the engine to keep the power levels.

3.5.1.2 Absolute Rotary Position Sensor

The Absolute Rotary Position Sensor is used to determine the speed (RPM’s) and position of the permanent magnet to the electromagnet in the Magnetic Chamber. The sensor information is sent to the ECU. Once the permanent magnets reach a set position, the Power Polarity Controller controls which are set in the ECU, the timing and amount of electricity.

3.5.1.3 Power Polarity Controller

The Power Polarity Controller is a multi-board PCB with is composed of two PCBs: Electromagnet Polarity Relay Module and Power Controller. It's controlled by the ECU based on the information from the Position Sensor.

3.5.1.4 Electromagnet Polarity Relay Module

The Electromagnet Polarity Relay Module is composed of two relays that will control the polarity of the electromagnets and the timing. There are three settings for each electromagnet.
Components

- Relay DPDT – controls the polarity
- Relay DPST – controls the On/Off
- Diode – diode between relay coil and ECU

Electromagnet Settings

- Polarity 1 Power On – DPDT set to ONE
- Off Power Off – DPST set to 0
- Polarity 2 Power On – DPDT set to TWO

Power Controller

The **Power Controller** controls the amperage levels for the electromagnet. The Power Controller is a DC Motor Speed Control PWM RC Controller with a voltage regulator. The Power Controller will take the max amp levels and decrease it to the level set by the ECU.

3.5.1.5 Rotary Torque Sensor

A **Rotary Torque Sensor** used to measure the torque of the Crankshaft. That information is used for setting the Magnetic Force from the electromagnets.

3.5.2 Electricity Management System

The **Electricity Management System** controls the electricity from the battery to and from the Power Plant. There are two types of electricity sources for the engine, batteries and a Power Plant.

3.5.2.1 Electricity Sources

- Power Plant - Generator or Alternator
- Battery Bank
- 12VDC Battery

Power Plant

The **Power Plant** is the electricity-generating source for the engine. It converts kinetic energy into electricity by turning an Alternator or a Generator-head. The type of source depends on the engine type.

- Alternator – Magnetic Renewable Engine
- Generator-head – Magnetic Renewable Generator

Battery Bank

The **Battery Bank** is the primary electricity storage for the engine. The Battery Bank is a large battery system composed of small batteries. It combines the electricity from the small batteries into higher voltages and amperages. The Battery Bank is used to start the engine. It has the power needed to operate the electromagnet, the engine systems and the starting system. Once the engine is operating, the Battery Bank is set in standby.

12VDC Battery

The **12VDC Battery** is the electricity storage for the ECU, Temperature Control System and other engine systems. It allows the ECU to monitor the engine. It will power these systems when the Power Plant is not operating.

3.5.2.2 Management System

Battery Bank Charging

The **Battery Bank Charging** will monitor and charge the Battery Bank from the Power Plant. The ECU will monitor the Battery Bank power level. Once the power is below at a set level, the battery will be charged by the Power Plant. The charging system will start the engine to operate the Power Plant to charge the Battery Bank.

12VDC Battery Charging

The **12VDC Battery Charging** will monitor and charge the 12VDC battery from the Power Plant or the Battery Bank. The ECU will monitor the 12VDC Battery power level. Once the power is below at a set level, the battery will be charged by:

- Power Plant if the engine is operating
- Battery Bank if the engine is not operating

The charging system will start the engine to operate the Power Plant to charge the 12VDC.

Smart Power Controller

The **Smart Power Controller** is designed to switch the electricity between the Power Plant and the Battery Bank. The switch is controlled by the ECU.

Usage

- Battery Pack Charging System
- Emergency power if the Power Plant fails
- Emergency power if the Battery Pack fails

DC/DC Converters

The **DC/DC Converter** is set to convert the raw electricity from the Battery Bank and Power Plant into two voltages for the electromagnet and the engine systems.

Electronic Power Switch Module

The **Electronic Power Switch Module** is the manual On/Off switch. The switch is controlled by the ECU. The ECU can control the switch turning the switch On/Off.
Components
• Relay SPST – controls On/Off to the electromagnet
• Diode – diode between relay coil and ECU

Starter System
The Starter System turns the Crankshaft by applying electricity to the Alternator or Generator-head. The starter relay will send electricity from the 48V battery to the Alternator or Generator-head. Once the engine reaches set RPMs, the electricity from the 48V battery will stop and electricity from the Alternator or Generator-head will operate the engine.

ECU Relay Module
The ECU Relay Module is the switch that provides electricity between the main systems and the 12VDC Battery. Controlled by the ECU. Designed to provide electricity to the ECU at all times. Once the ECU is not receiving electricity from the Power Plant and the Battery Bank the ECU Relay will switch to the 12VDC Battery.

Components
• Relay DPDT – switch the electricity
• Diode – diode between relay coil and ECU

Fluid Pump Control Module
The Fluid Pump Control Module will control the electricity to the Fluid Pump, controlled by the ECU.

Components
• Relay SPST – controls the On/Off of the pump
• Diode – diode between relay coil and ECU
• Power Controller – controls the electricity level

Heating Coil Control Module
The Heating Control Module will control the electricity to the Heating Coil, controlled by the ECU.

Components
• Relay SPST – controls the On/Off of the heater coil
• Diode – diode between relay coil and ECU
• Power Controller – controls the electricity level

AC Cooling Control Module
The AC Cooling Control Module will control the electricity to the AC Coil, controlled by the ECU.

Components
• Relay SPST – controls the On/Off of the AC Unit
• Diode – diode between relay coil and ECU
• Power Controller – controls the electricity level

Lubricating Control Module
The Lubricating Control Module will control the electricity to the lubricating pump, controlled by the ECU.

Components
• Relay SPST – controls the On/Off of the pump
• Diode – diode between relay coil and ECU
• Power Controller – controls the electricity level

Circuit Protector
The Circuit Protectors controls electric overload. There are two types, the electronic protectors and the fuses. The electronic protector will automatically reset. The fuses will be set to protect the engine from large electricity spikes.

Components
• Solid State Remote Power Controllers – 24V - 48V
• Electronic Circuit Breaker – 12V Engine System

3.6 Engine Material
The engine will be composed of two different types of material, nonmagnetic and magnetic shielding.

The Nonmagnetic Material prevents any magnetic attraction between materials. The Chamber, Frame, Frame Rail, Connecting Rod and the Electromagnetic mount will be composed of the same material.

The Magnetic Shielding Material prevents any magnetic interference from the Electromagnets and Permanent Magnets. The material will encircle the chamber to redirect any electromagnetic waves.

Aluminum Alloys
Aluminum Alloys are most of the parts in the engine. Aluminum is a non-ferrous metal, non-magnetic. All parts will be Hard Coat Anodized.

• Corrosion Resistance
• Nonconductive

Titanium Round Rod
The Titanium Round Rod is lightweight & strong to support the Magnetic Shaft.

Braided Electrical Wire
The Braided Electrical Wire will protect the wire from electromagnetic interference.

• Watertight
• EMI/RFI Shielding
Braided Hoses

The Braided Hose for the Temperature Control System and the Ball Bearing Lubricating System.

Magnetic Shielding

The Magnetic Renewable System uses magnetic energy therefor producing magnetic interference. That interference can affect the electrical systems and different electronics. The engine needs magnetic shielding. The shielding is designed to shield from internal and external magnetic interference (EMI/EMP). This shielding will use shielding material and O-Rings.

Magnetic Shielding
- All wires
- Electronics Enclosures – paint
- Electromagnet – material housing
- Engine Block – paint

3.7 Engine Operation

Engine Torque & Horsepower Rating

The Magnetic Renewable System is rated by torque not horsepower. This is different compared to the standard combustion engine. The change is because of the haft stroke of the Magnetic Renewable System. Horsepower rating both engines, but the torques rate the work of the engine. The Magnetic Renewable System standardizes the rating by rating all engines at 1,300 RPMs for torque and 5,000 RPMs for horsepower.
The Magnetic Renewable System has four variations. Each variation has a specific application.

- Magnetic Renewable Engine – Vehicles & Equipment
- Magnetic Renewable Generator – Electricity
- Magnetic Renewable Motor – Trains and Ships
- Magnetic Renewable Aircraft Engine – Propeller Aircraft

4.1 Magnetic Renewable Engine

The Magnetic Renewable Engine is the version of the Magnetic Renewable System. This version connects to an Alternator for Electricity. It is Renewable Electric Transportation.

Usages
- Vehicles, Boats, Ships
- Construction and Agricultural Equipment

4.2 Magnetic Renewable Generator

The Magnetic Renewable Generator is the version of the Magnetic Renewable System. This version connects to a Generator-head for Electricity. It is Renewable Electricity Generation.

- Stage 1 – 1 kW to 39 kW
- Stage 2 – 40 kW to 900 kW
- Stage 3 – 1 MW to 5+ MW

Usages
- Replace Large Power Plants
- Microgrids / Decentralized Energy
- Home and Buildings Electricity
- Satellites – Replace Solar Panels

The Magnetic Renewable Generator mounted in a frame that supports the additional equipment. There are two configurations: Independent and Dependent. The difference is the temperature control.

4.2.1 Independent

The Independent configuration is with a radiator, AC and electric heater.

Usages
- Trailer
- Portable
- Homes

4.2.2 Dependent

The Dependent configuration is with two electric heaters and a chiller.

Usages
- Containers
- Buildings
- Warehouse

4.2.3 Power Configurations

Power Plants

A power station also referred to as a Power Plant or powerhouse and sometimes generating station or generating plant, is an industrial facility for the generation of electric power. Most power stations contain one or more generators, a rotating machine that converts mechanical power into electrical power.

Microgrids

A Microgrid is a discrete energy system consisting of distributed energy sources (including demand management, storage, and generation) and loads capable
of operating in parallel with, or independently from, the main power grid.

Microgrid energy, as the name suggests, is produced closer to where used rather than at a large plant elsewhere and sent through the national grid.

This local generation reduces transmission losses and lowers carbon emissions. Security of supply increased nationally as customers do not have to share a supply or rely on relatively few, large and remote power stations.

Off-Grid

Off-Grid is an energy system that provides electricity to one location. It does not support any grid or any other locations.

**4.3 Magnetic Renewable Motor**

The Magnetic Renewable Motor is the version of the Magnetic Renewable System. This version is composed of the Magnetic Renewable Generator to produce electricity and a standard Electric Motor.

**Usages**
- Trains – Cargo & Passenger
- Large Ship – Cargo, Fishing, Passenger, & Military

The Magnetic Renewable Motor can increase the horsepower by increasing the number of Magnetic Renewable Generators. This increase in electricity will increase the horsepower and torque of the Electric Motor.

**4.4 Magnetic Renewable Aircraft**

The Magnetic Renewable Aircraft Engines is the version of the Magnetic Renewable System. This version connects to an Alternator for electricity and a propeller.

**Usages**
- Single Engine Propeller Plane
- Twin Engine Propeller Plane
5.1 Transportation

5.1.1 Combustion Engine

The **Combustion Engine** is used to convert fossil fuels (Gasoline, Diesel, and Natural Gas) into horsepower.

The Combustion Engine takes the Fossil Fuels and converts it to Mechanical Energy. The Fossil Fuel is brought into a combustion chamber. In the combustion chamber, the fuel is ignited, creating a small explosion. This explosion pushes down on a piston and turns a Crankshaft. The gas from the explosion is exhausted out of the engine and the process is repeated.

The Crankshaft is the reason why the combustion engine is good at making horsepower. The Mechanical Advantage from the Crankshaft increases the energy from the combustion process and converts that energy into Mechanical Energy for Transportation or Electricity Generation.

**Advantage**

- A large amount of HP

**Disadvantage**

- Produces C0₂ Gas
- Fossil Fuels

The Magnetic Renewable System produces 87% more horsepower than the combustion engine. This is because the Magnetic Renewable System turns the Crankshaft with fewer strokes, which increases the horsepower.

This chart shows the difference between the combustion engine (IC) and the Magnetic Renewable System.

5.1.2 Electric Engine

The **Electric Engine** converts electricity into Magnetic Energy then into Mechanical Energy. The electromagnets are placed around a permanent magnet that Magnetic Force turns a Shaft. The engine uses electricity from generators or batteries. The engine produces NO Carbon Dioxide Gas when using batteries. The engine produces carbon dioxide when using a combustion engine with a generator.

The Electric Engine cannot replace the Combustion Engine with the horsepower and torque.

**Advantage**

- No Exhaust
- No Fossil Fuels

**Disadvantage**

- Requires Electricity
- Large Power for HP

The Magnetic Renewable System uses 67% less energy for horsepower than the Electric Engine. This is because the electric engine turns a Shaft and the Magnetic Renewable System turns a Crankshaft.

5.1.3 Hybrid Engine

The **Hybrid Engine** is the combustion engine and the Electric Engine is working together in one vehicle. The combustion engine is the main source of propulsion, but is supplemented by an Electric Engine. The Hybrid Engine is for small vehicle propulsion because the amount of electricity required for Electric Engine increases with the size of the vehicle. Batteries and a generator attached to the Hybrid Engine cannot be the size to fit in the standard vehicles. The combustion engine converts Chemical Energy to Mechanical Energy and the Electric Engine converts electricity into Magnetic Energy into Mechanical Energy. The engine uses fossil fuel for the combustion engine and electricity from a generator and batteries. The byproducts of the engine are carbon dioxide gas from the burning of the fossil fuels. The limitation of the engine is the Electric Engine.

The future of the Hybrid Engine is limited because it does not offer high fuel mileage and it does not offer an end to the dependency of Oil and reduce or end carbon dioxide production.

**Combustion & Electric**

The **Combustion Engine** is the primary engine for the production of horsepower. The Electric Engine is used to provide horsepower when the vehicle is at a steady speed. The idea is that the Combustion Engine will use less fossil fuel when the Electric Engine is providing
power. The Combustion Engine will charge the battery, which provides electricity to the Electric Engine.

**Combustion to Electric**

The Electric Engine is the primary engine for the production of horsepower. The Combustion Engine is used to provide electricity to the Electric Engine. The idea is that the Combustion Engine is small and will require less fuel to operate a generator.

### 5.2 Electricity Generation

#### 5.2.1 Fossil Fuels Power

**Fossil Fuels** (Oil, Coal, & Natural Gas) are converted into electricity by a four-stage process. 1) The fossil fuel is used to produce heat. 2) The heat is applied to water and converts the water to steam. 3) The steam is used to turn a turbine. 4) The turbine turns a Shaft. The Shaft is connected to a generator to produce electricity.

**Advantage**
- Common Technology

**Disadvantage**
- Limited Supply
- Greenhouse Gases

The other process of using fossil fuels is the engine-generator. The engine-generator uses, Gasoline, Diesel, or Natural Gas in a Combustion Engine to turn a Shaft for Electricity or Transportation.

#### 5.2.2 Wind Power

The **Wind Power** technology converts the force of the Wind into Mechanical Energy then into electricity. The Wind turns the propeller blades that turn a generator that produce electricity. There are no byproducts, but to produce a large amount of electricity the Wind Turbine must be big and it takes multiple turbines to produce a large amount of electricity.

The future of Wind Power is that it is in areas that have room and a steady wind. The wind can be a good clean option for Electricity Generation.

**Advantage**
- No Fossil Fuel
- No C02 Gas

**Disadvantage**
- Fuel by Wind

#### 5.2.3 Nuclear Power

**Nuclear Power** produces a large amount of electricity. The plant converts Nuclear Fission into Mechanical Energy then into electricity. The Nuclear Fission heats water to the boiling point, the steam turns a turbine that turns a generator that produces electricity. Nuclear Power requires nuclear fuel to produce fission or heat. Nuclear power byproducts are radiation. That radiation is dangerous to humans and will last for millions of years.

The future of Nuclear Power is strong, but nobody wants the byproducts in their neighborhood.

**Advantage**
- No Fossil Fuel
- No C02 Gas

**Disadvantage**
- Nuclear Fuel
- Radiation

#### 5.2.4 Water Power

**Hydroelectric**

**Hydroelectric Dams** produce a large amount of electricity. The dam converts water motion into Mechanical Energy then into electricity. The water stored behind the dam moves through pathways, as the water moves it turn a turbine that turns a generator to produce electricity. There are no byproducts, but the size of the dams makes it only practical in certain locations.

The future of Hydroelectric Dams is only limited by the large size of the dams, few locations and the amount of water require for the dams.

**Advantage**
- No Fossil Fuel
- No C02 Gas
- Large Power

**Disadvantage**
- Size of Dam
- Few Locations

**Wave**

**Wave** technology converts water movement into Mechanical Energy then into electricity. The motion of the water can move a turbine or a piston and a Crankshaft that will turn a generator to produce electricity. There are no byproducts.

The future of wave technology will grow as the electricity that it provided is increased.

**Advantage**
- No Fossil Fuel
- No C02 Gas

**Disadvantage**
- Fuel by Waves
5.2.5 Solar Power

Solar Power produces electricity in two ways, Solar Panels and Solar Heat. The Solar Panel converts the sun’s energy into electricity. Solar Heat uses the sun to heat water into steam, that steam turns a turbine to produce electricity. There are no byproducts, but to produce a large amount of electricity, there must be a large number of Solar Plants.

### Solar Heat

- No Fossil Fuel
- No C02 Gas

### Solar Panel

- Fueled by the Sun

5.2.6 Geothermal Power

Geothermal is using heat from the earth to produce steam. The steam turns a turbine. The turbine turns a Shaft connected to a generator. Geothermal is limited to certain locations where the earth’s heat is close to the surface.

**Advantage**

- No Fossil Fuel
- No C02 Gas

**Disadvantage**

- Limited Location
VI Conclusion
Magnetic Renewable System

The Magnetic Renewable System will end the World’s dependence on fossil fuels. It will end the primary sources of Climate Change. It is a new form of Renewable Energy. The Magnetic Renewable System will replace the standard Mechanical Energy System in Transportation and Electricity Generation.

The Magnetic Renewable System changes the understanding of energy and energy systems. Most energy systems convert energy from one form to another, Mechanical Energy System. The same type of energy that powers the Magnetic Renewable System and begins the conversion is one of the types of energy at the end of the conversion.

6.1 End Energy Dependence
The Magnetic Renewable System will end the fossil fuels required for the Mechanical Energy System. It uses none of the standard fuels of Mechanical Energy System. It will replace all fuels for transportation. It will replace most of the energy for Electricity Generation.

6.2 End Climate Change
The Magnetic Renewable System will reduce the effects of Climate Change, from Transportation and Electricity Generation. The engine will end over 60% of greenhouse gases, which will affect the climate of the World.

6.3 Renewable Energy System
The Magnetic Renewable System is Renewable Energy System because it uses electricity and converts Kinetic Energy to electricity.

The Magnetic Renewable System is an electrically powered renewable engine. The engine uses electricity to power an electromagnet in a Magnetic Chamber. The Magnetic Chamber converts the electrical energy to Mechanical Energy to turn a Crankshaft. The Mechanical Energy of the Crankshaft is for Transportation, and Electricity Generation.

The key to the engine is not the Magnetic Chamber but the number of strokes the Crankshaft is turned. The Magnetic Chamber turns a Crankshaft like the combustion chamber in the Combustion Engine. The main difference is the fuel, chemical (fossil fuels) and electrical. The Crankshaft turning a haft stroke is the key to the engine, which is due to Mechanical Advantage. The Mechanical Advantage amplifies the output force over the input force, the force from the Magnetic Chamber. The input force, Mechanical Energy, from the Crankshaft turns an Alternator and Shaft. Part of the Mechanical Energy converts to electricity using the Alternator. The remaining Mechanical Energy for Transportation or Renewable Electricity Generation.

6.4 Magnetic Renewable System
The Magnetic Renewable System is the combination of two systems working together, Electromagnetic Reciprocating Engine and Electric Power System.

The Magnetic Renewable System has four variations. Each variation has a pacific application.

- Magnetic Renewable Engine – Vehicles
- Magnetic Renewable Generator – Electricity
- Magnetic Renewable Motor – Trains and Ships
- Magnetic Renewable Aircraft Engine – Propeller Aircraft

The Magnetic Renewable System is Clean and Green Renewable Energy System and the World’s First Truly Green and Clean Engine.

Magnetic Renewable System
- No Fossil Fuels
- Zero Emissions
- Renewable Energy
- Renewable Electric Transportation
- Renewable Electricity Generation 2 kW – 5+ MW per engine
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7.1 Appendix A – System Configurations

- RPM P-L2-6,394
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- RPM P-L6-6,394
- RPM P-L8-6,394
- RPM P-L10-6,394
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7.1 Appendix A – System Configurations

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7.1 Appendix A – System Configurations

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7.2 Appendix B – Engine Formulas

The Magnetic Renewable System is an energy conversion system. The system converts electrical energy into kinetic energy into electrical energy. The system has three primary subsystems; the Magnetic Chamber, the crankshaft and electricity generation. These three subsystems work together, but are built around turning the crankshaft. The force it takes to turn the crankshaft is from the Magnetic Chamber.

The system is based on the Stroke Distance, the number of strokes and the force it takes to turn the crankshaft. This information is based on the crankshaft of the combustion engine.

The Magnetic Chamber is designed around the size of the Opposite Pole Electromagnet, the size of the Permanent Magnet and the size of the Linear Magnetic Bearings needed to turn a Crankshaft.

7.2.1 Base Information

The engine is built around the crank, stroke distances, of the crankshaft and the amount of force it takes to turn that crankshaft. That information is based on an existing combustion engine. The information from the combustion engine is used in a MEP formula to find the force and size the magnets. The Force on a piston is applied by the pressure from the combustion process. This pressure can be converted into Force.

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<td>Bore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Strokes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Cylinders</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ F = \text{Force on the piston} = \text{F}\# \times \text{a} \]

\[ a = \text{Piston Area} \]

\[ p = \text{Piston Pressure} \]

\[ \text{Convert Newton (N) to Pounds Force (LBF)} \]

\[ N \times 0.2248 = \text{lbf}. \]

7.2.2 Convert Pressure to Force - MEP

The pressure of the combustion chamber can be found by using the MEP Formula. The Mean Effective Pressure (MEP) is used to convert the pressure of the combustion process to force pounds (LBS). The data from the Combustion Engine is used to find the Magnetic Force of the Opposite Pole Electromagnet and the Permanent Magnet in the Magnetic Chamber.

The Mean Effective Pressure is an abstraction of the pressure exerted into the combustion chamber of an internal Combustion Engine. Mean Effective Pressure is abbreviated MEP. It is calculated by taking the torque exerted by the engine over a revolution for a 2 Stroke engine and two revolutions for a 4 Stroke, and dividing it by its displacement, in SI units, for MEP in Pascal. The number of strokes is changed from 4 Stroke to .5 Stroke.

### MEP Formula

**MEP .5 – 1/2 Stroke**

\[ MEP = \frac{.5\pi T}{V} \]

\[ MEP = \frac{.5\pi \times TN_m}{Vm^2} = Pa \]

\[ T = \text{Torque (Newton Meters – Nm)} \]

Convert:

- Foot Pounds – FT-LBS to Newton Meters – Nm
  - Ft-lbs x 1.356 = Nm

\[ \pi = \text{Piston Area} \]

The piston is a circle and to find the area of a circle is \( \pi \times \text{radius2} \). The radius is half the diameter of a circle. The Diameter is the bore of the engine. Bore must be in millimeters, to convert inches (IN) to millimeters (MM) multiply by .03937.

\[ \text{Bore divided by 2 = radius} \]

\[ \text{Bore}/2 = \text{radius} \]

\[ \text{Piston x by radius squared = area} \]

\[ 3.14 \times \text{radius2} = \text{mm2} \]

\[ \text{Piston area} = \text{mm2} \]

\[ V = \text{Displacement} \]

The bore is changed will affect the displacement. The displacement will have to be changed.

\[ \pi / 4 \times \text{bore2} \times \text{stroke} \times \text{number of cylinders} \]

(cubic meters m³ / cc – cm³)

\[ \text{Convert} \]

\[ \text{mm3} \times 0.00001639 = \text{m³} \]

\[ \text{Cubic inch in} \times 10^{-3} = \text{N/mm2} \]

\[ \text{Pa} \]

### Chamber Magnetic Forces

The answer from the MEP formula is used to set the magnetic force needed in the Magnetic Chamber. The Magnetic Force is divided into three levels, the Chamber Output Force, the Chamber Weight, and the Crankshaft Input Force. The Chamber Output Force is the MEP Force. The Chamber Weight is the MEP Force and all the weight of Magnetic Chamber. The Crankshaft Input Force is the Chamber weight plus 20% to move the crankshaft.

### Chamber Magnetic Force

<table>
<thead>
<tr>
<th>Weight</th>
<th>Force 1</th>
<th>Force 2</th>
<th>Force 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBS</td>
<td>10</td>
<td>184.33</td>
<td>194.33</td>
</tr>
<tr>
<td>N</td>
<td>2.25</td>
<td>819.93</td>
<td>822.18</td>
</tr>
</tbody>
</table>

\[ \text{Weight} = \text{Magnetic Chamber is composed of} \]

- weight of the Permanent Magnets and mounts
- weight of the Linear Guide Rail
- weight of the Connecting Rod

\[ \text{Force 1 = Chamber Output Force} \]

\[ \text{Force 2 = Force 1 + Chamber Weight} \]

\[ \text{Force 3 = Force 2 + 20% = Crankshaft Input Force} \]
7.2.3 Crankshaft Mechanical Advantage

There is Potential Energy in the crankshaft. The Crankshaft Ideal Mechanical Advantage of Lever (IMA) can be used to calculate the mechanical advantage of the crank of the crankshaft. The crank has two forces, Input Force from the Magnetic Chamber and the Output Force to the shaft of the crankshaft. The length of the crank and the radius of the shaft is multiplied by the Input Force. The answer is the Crankshaft Output Force. The IMA is used to find the Chamber Output Force (FC) and Output Force (FS) of the crankshaft.

Ideal Mechanical Advantage of Lever (IMA)

\[ \frac{L_C \times F_C}{L_S} = F_S \]

- \(L_C\) = Length of Crank
- \(L_S\) = Length (radius) of shaft
- \(F_C\) = Magnetic Chamber Output Force
- \(F_S\) = Crankshaft Output Force

7.2.4 Power Output Forms

**Torque**

\[ T = F \times D \]

\[ T = \text{Force} \times \text{Distance} \]

- \(F\) = Output (Newton)
- \(D\) = Stroke Distance
- \(T\) = FT-LBS @ 1,300

**Horsepower**

\[ HP = \frac{RPM \times T}{5252} \]

- \(T\) = 1,300 RPM Torque
- \(RPM\) = 5,000 RPM
- \(RPM\) = 10,000 RPM

**Electricity**

\[ kW = HP \times 1.2155 \]

- \(HP\) = Based on 5,000 RPM
- \(HP\) = Based on 10,000 RPM

7.2.5 Renewable Energy

The Electromagnetic Reciprocating Engine can be configured to be a Renewable Energy source. The engine turns an electrical source, a generator or alternator, converting the Mechanical Energy of the engine into electricity. Using the Alternator or Generator requires the subtraction of energy from the Electromagnetic Reciprocating Engine. To find the amount of Renewable Energy, starts with the information from the Electromagnetic Reciprocating Engine.

**Renewable Formula**

\[ R_E = B_E - E_R \]

- \(R_E\) = Renewable Energy
- \(B_E\) = Battery Energy
- \(E_R\) = Required Energy
- \(Battery\) = HP and Watts for the engine
- \(Energy\) = 30% energy required to operate
  - Convert 1 HP to 1,2155 Watt
  - Convert 1 Watt to 8.227 HP

7.2.6 Engine Example

### 7.2.6.1 Combustion Engine

**Combustion Engine**

<table>
<thead>
<tr>
<th>5.4L Triton SOHC 24 Valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horsepower</td>
</tr>
<tr>
<td># of Stroke</td>
</tr>
<tr>
<td># of Pistons</td>
</tr>
<tr>
<td>Stroke Distance</td>
</tr>
<tr>
<td>Bore Size</td>
</tr>
<tr>
<td>Torque</td>
</tr>
<tr>
<td>RPM</td>
</tr>
</tbody>
</table>

### 7.2.6.2 Conversion Formula

**Mean Effective Pressure MEP**

\[ MEP = \frac{5 \pi \times T \text{Nm}}{V \text{m}^3} = \frac{\text{N}}{\text{m}^2} \]

<table>
<thead>
<tr>
<th>Piston Area (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radius</td>
</tr>
<tr>
<td>Area</td>
</tr>
</tbody>
</table>

**Engine Displacement**

<table>
<thead>
<tr>
<th>Displacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>in³ to m³</td>
</tr>
<tr>
<td>0.0053962 m³</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MEP</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1284641 N/mm²</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chamber Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Lbs.</td>
</tr>
</tbody>
</table>

**Chamber Force**

<table>
<thead>
<tr>
<th>Force 1 = Chamber Force</th>
<th>819.93 N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Force 2 = Force 1 + Chamber Weight</td>
<td>842.17 N</td>
</tr>
<tr>
<td>Force 3 = Force 2 + 20%</td>
<td>1,010.60 N</td>
</tr>
</tbody>
</table>

**Crankshaft Force**

<table>
<thead>
<tr>
<th>Crankshaft Input Force (Newton)</th>
<th>1,010.60 N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crankshaft Input Force (pounds)</td>
<td>227.19 Lbs.</td>
</tr>
<tr>
<td>Stroke Distance (millimeter)</td>
<td>105.66 mm</td>
</tr>
</tbody>
</table>
### Shaft

| Diameter (in) | 0.472 |
| Diameter (mm) | 12.00 |
| Radius (in) | 0.236 |
| Radius (mm) | 6 |

### Idea Mechanical Advantage

\[
IMA = \frac{L_C}{L_S}
\]

- \(L_C\): Lever Arm Energy (input) Stroke = 105.66 mm
- \(L_S\): Lever Arm Resistance (output) = 6 mm
- IMA = 17.61 N

**Output** = Crankshaft Input Force \* IMA

- Crankshaft Output Force (Newton) = 17,397 N
- Crankshaft Output Force (Pounds) = 4,001 Lbs.

### HP, kW & Torque

<table>
<thead>
<tr>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>( F = \text{Output Force (Newton)} \times D )</td>
</tr>
<tr>
<td>( D = \text{Stroke Distance (Meter)} \times 10^{-3} )</td>
</tr>
<tr>
<td>( T = \text{Newton-mm} \times 10^{-6} )</td>
</tr>
<tr>
<td>( T = \text{Foot-Pounds FT-lBS} \times 0.1382 )</td>
</tr>
<tr>
<td>Torque @ 1,300 RPM = 5,603 Ft-lbs</td>
</tr>
<tr>
<td>Torque @ 1,300 RPM = 7,597 Nm</td>
</tr>
<tr>
<td>kW</td>
</tr>
<tr>
<td>Watts @ 5,000 RPM = 6,483 kW</td>
</tr>
<tr>
<td>Watts @ 10,000 RPM = 12,967 kW</td>
</tr>
<tr>
<td>Horsepower</td>
</tr>
<tr>
<td>HP @ 5,000 RPM = 5,334 HP</td>
</tr>
<tr>
<td>HP @ 10,000 RPM = 10,668 HP</td>
</tr>
</tbody>
</table>

### Renewable Energy Requirement

- HP @ 5,000 RPM = 1,600 HP
- Watts @ 5,000 RPM = 1,945 kW
- HP @ 10,000 RPM = 3,200 HP
- Watts @ 10,000 RPM = 3,890 kW

### Chamber Magnetic Force

<table>
<thead>
<tr>
<th>Force</th>
<th>Weight</th>
<th>Force 1</th>
<th>Force 2</th>
<th>Force 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBS</td>
<td>5</td>
<td>184.33</td>
<td>189.33</td>
<td>227.19</td>
</tr>
<tr>
<td>N</td>
<td>22.24</td>
<td>819.93</td>
<td>842.17</td>
<td>1,010.60</td>
</tr>
</tbody>
</table>

### Electromagnetic Reciprocating Engine

<table>
<thead>
<tr>
<th>Engine</th>
<th>5,000 RPM</th>
<th>10,000 RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP</td>
<td>kW</td>
<td>HP</td>
</tr>
<tr>
<td>Battery</td>
<td>5,334</td>
<td>6,483</td>
</tr>
<tr>
<td>Torque@1,300</td>
<td>5,603</td>
<td>Ft-lbs</td>
</tr>
<tr>
<td>Chamber #</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Stroke Distance</td>
<td>4.16 in</td>
<td>105.66 mm</td>
</tr>
<tr>
<td>Crankshaft Input Force</td>
<td>227 Lbs</td>
<td>1,011 N</td>
</tr>
</tbody>
</table>

### Magnetic Renewable Engine

<table>
<thead>
<tr>
<th>Mag Power V8 &amp; 5,002</th>
</tr>
</thead>
<tbody>
<tr>
<td>013A PLAS 8 &amp; 5,002</td>
</tr>
<tr>
<td>1,000 RPM</td>
</tr>
<tr>
<td>HP</td>
</tr>
<tr>
<td>Renewable</td>
</tr>
<tr>
<td>Battery</td>
</tr>
<tr>
<td>Torque @ 1,300</td>
</tr>
<tr>
<td>Chamber #</td>
</tr>
<tr>
<td>Stroke Distance</td>
</tr>
<tr>
<td>Crankshaft Input Force</td>
</tr>
</tbody>
</table>

### 7.2.6.3 System Forces

The Magnetic Renewable System is designed around the forces produced from the Magnetic Chamber and Crankshaft. These forces need to be calculated to size the equipment. These forces began with the magnetic forces of the Magnetic Chamber. The Magnetic Chamber produces linear forces from the Permanent – Electromagnet Magnet. The Magnetic Chamber forces are calculated by adding the magnetic forces, the weight of the chamber and 20% increase in forces, the Chamber Output Force.

Guide Rail Linear Bearing Force is the lateral force between Permanent Magnetic Bearing and the Magnetic Shaft plus 25%.

The Connecting Rod Bearing Forces is based on the Chamber Output Force, the weight of the Connecting Rod plus 25%.

The Crankshaft Bearing Force is based on the Crankshaft Output Force plus 25%.

**Guide Rail Bearing Force**

The information is used to size the Guide Rail Bearing Force. The Forces are based on the lateral forces on the Magnetic Shaft. The lateral force on the Guide Rail is the weight of the Magnetic Chamber. This is because the Guide Rail has no lateral movement only linear movement.

**Lateral Force Formula**

\[ F = w \times 2 \times \Delta \]

- \( F\): Force
- \( w\): weight of the Magnetic Chamber

**Bearing Load**

The bearing load is the force applied to the bearings. There are two different loads. The Connecting Rod Bearing which has the load from the Magnetic Chamber. The crankshaft bearing which has the load from the crankshaft after the potential energy has been accessed.

- Connecting Rod Bearing
- Crankshaft Bearing

**System Forces**

<table>
<thead>
<tr>
<th>Bearing Dynamic Load</th>
<th>16,165 Lbs.</th>
<th>71,901 Lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bearing Lateral Force</td>
<td>35 Lbs.</td>
<td>539.15 Lbs.</td>
</tr>
<tr>
<td>Chamber Weight</td>
<td>5.00 Lbs.</td>
<td>35.00 Lbs.</td>
</tr>
</tbody>
</table>
**Bearing Dynamic Load**

<table>
<thead>
<tr>
<th>Chamber Linear Force Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Torque</strong></td>
</tr>
<tr>
<td><strong>Stroke</strong></td>
</tr>
<tr>
<td><strong>Total Force</strong></td>
</tr>
</tbody>
</table>

\[
F = \frac{W}{d}
\]

- \( F \) = Force (N)
- \( W \) = Torque (J)
- \( d \) = Stroke Distance (M)

Convert:
- Ft-lbs to joules: Ft-lbs \( \times \) 1.356
- mm to m: Mm/1000
- N to lbs: N/4.448

http://www.ajdesigner.com/phpwork/work_equation_force.php#ajscroll
7.3 Appendix C – Engine Uses

Electricity Generation
- Large
- Medium
- Small

On-Highway
- Automobile
- Fire & Emergency
- Heavy-duty Truck
- Medium-Duty Trucks
- Motorhome
- School Bus
- Urban Bus & Shuttles

Off-Highway
- Agriculture
- Construction

Marine
- Boats
- Ships
- Yachts

Light Aircraft
- Single Engine Propeller
- Twin Engine Propeller

Rail
- Freight
- Passenger

7.3.1 Renewable Electricity Generation

- Small Generator
  - 1 kW – 39 kW

- Medium Generator
  - 40 kW – 900 kW

Large Generators
- 1 MW – 5+ MW

7.3.2 Buses

- School Bus
- Public Transit Bus
- Transit Bus

7.3.3 Ships & Boats

- Cargo Ships

- Cruise Ships

- Fishing Vessels

- Boats

7.3.4 Trains

- Cargo Trains
- Magnetic Trains
- Passenger Trains
7.3.5 Equipment

Construction Equipment

Farm Equipment

7.3.6 Vehicles

Cars

SUVs

7.3.7 Aircrafts

Single Engine Aircraft

Twin Engine Aircraft

7.3.8 Defense Equipment

7.3.8.1 Ground Vehicle Engines

M1126 Stryker
- Caterpillar C7 350 HP
- 310 miles range

MRAP All-Terrain Vehicles
- 370 HP Caterpillar Turbo-Diesel Engine
- 320 miles range

M2 Bradley

HET
- 700 HP C8 Cat Diesel
- 400 mile range

Ground Mobility Vehicle GMV
- 150 HP Diesel Engine
- 450 miles range

M113 Armored Personnel Carrier

HEMTT
- 515 HP C15 Cat Diesel

M1070 MET
- Detroit Diesel 92 8V92 500 HP
- 425 miles range

M109 Paladin
7.3.8.2 Marine Vehicles Engines

Special Operations 'Mothership'
Cragoside Ro-Ro Cargo Ship
- Diesel Electric Engine
- 8000 miles range

MK V Special Operations Craft
- Twin 2285 HP 12V396 TE94 Engine
- 500 + nautical miles range

MK VIII MOD 1 SEAL Delivery Vehicle
- Electricity Engine
- 120 nautical miles range

Special Operations Craft-Riverine
- Twin 440 HP Yammer 6LY2M-STE Diesel Engine
- 125 nautical miles range

AAV7 Amphibious Assault Vehicle
- 400 HP Cummins VT400 Diesel Engine
- 300 nautical miles range

MK VIII MOD 1 SEAL Delivery Vehicle
- Electricity Engine
- 120 nautical miles range

7.3.8.3 Navy Equipment Engines

Cruisers
- Nuclear Powered

Aircraft Carrier
- Nuclear Powered

Submarine
- Nuclear Reactor

7.3.8.4 Electricity Generators

Large Generators
- 200kW to 2000kW per
- Size of fuel supply

Trailer Generators
- 40kW to 100kW per
- 5 hours Operating Time

Portable Generators
- 2kW to 10kW per
- 3 hours Operating Time
7.3.8.5 Aircraft Engines

**MQ-1 Predator Drone**
- Current
  - 115 Engine Propeller
  - 400 Nautical Miles

**Magnetic Renewable Engine**
- Mag Power V8-140
- Unlimited Range
- No Sound
- Low Heat Signature

7.3.8.6 Exoskeleton Suit Power Source

**Exoskeleton**
- Current
  - Plugged to Powered

**Magnetic Renewable Engine**
- PowerPack
- Magnetic Pulse Generator
  - 12 kW of Electricity
  - Unlimited Operating Time
  - No Sound
  - No Exhaust Trail
  - Low Heat Signature
7.4 Appendix D – Intellectual Property

7.4.1 Electromagnetic Reciprocating Engine

An electromagnetic engine comprises an electromagnet having opposing magnetic poles at the ends thereof. A non-magnetic rigid support is mounted for oscillatory stroke movement relative to the electromagnet. A Crankshaft is coupled to the support; a sensor is coupled to the Crankshaft and outputs a Crankshaft position signal. First and second permanent magnets are affixed to the support on either side of the electromagnet and are oriented so as to present the same magnetic pole to each respective end of the electromagnet. The permanent magnets are spaced from one another by a distance approximately equal to the distance between the first and second ends of the electromagnet plus the stroke movement of the support. A timing circuit is operative to switch the electromagnet between first and second energized states in response to the Crankshaft position signal. Also disclosed is an electromagnetic engine in which a piston moves along guide rails.

The invention claimed is:

An electromagnetic engine, comprising: an electromagnet energizable so as to have opposing magnetic poles at first and second ends along an axis thereof, the electromagnet having a first magnetic pole orientation in a first energized state, and a second magnetic pole orientation in a second energized state; a Crankshaft; a sensor coupled to the Crankshaft and adapted to output a signal as a function of Crankshaft position; a non-magnetic rigid support coupled to the Crankshaft and mounted for oscillatory stroke movement relative to and in the direction of the axis of the electromagnet; first and second permanent magnets affixed to the support and on either side of the electromagnet, each permanent magnet being oriented to present the same magnetic pole to each respective end of the electromagnet and being spaced from the other permanent magnet by a distance approximately equal to the distance between the first and second ends of the electromagnet plus the stroke movement of the support; a timing circuit operative to switch the electromagnet between the first and second energized states in response to the output signal.

The engine as in claim 1, further comprises: an alternator coupled to the Crankshaft and adapted to convert at least a portion of a rotational energy of the Crankshaft into electrical energy.

The engine as in claim 2 is further comprised of: a rechargeable power storage device electrically connected to the timing circuit to supply power to energize the electromagnets, wherein the alternator provides electrical energy to recharge the rechargeable power storage device.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to a reciprocating engine, and more particularly to an electromagnetic reciprocating engine.

2. Discussion of the Related Art

Typical internal combustion engines comprise a piston that reciprocates within a cylinder. The cylinder is capped with a valve head. A combustion chamber is formed between the top of the piston, the cylinder, and the valve head. Into this combustion chamber, air and fuel are introduced, mixed, and subsequently ignited. The combustion of the fuel confined within the combustion chamber generates a force that causes the piston to be thrust down within the cylinder.

The bottom portion of the piston is operationally connected to a Crankshaft. The linear motion of the piston within the cylinder causes the Crankshaft to rotate. Thus, a linear reciprocating motion of the piston in transformed into rotational motion. The rotating Crankshaft is used to drive further mechanical devices, such as driving the transmission of an automobile to allow the car to drive.

Automobiles powered by internal combustion engines include starter motors. Starter motors are used to start the combustion cycle of the engine. When the ignition key is turned, electrical power from the car’s batteries is supplied to the starter motor. The starter motor rotates the Crankshaft, which causes the pistons and valves to move so that air and fuel are drawn into the combustion chamber and ignited. Once the combustion cycle is started, the starter motor is no longer needed and the engine continues to run by the combustion of fuel.

In addition, an alternator is included. The alternator is connected to the Crankshaft and the spinning of the Crankshaft drives the alternator. The spinning of the alternator generates electricity, which may be used to power the car’s electrical systems or to recharge the car’s batteries.

Some attempts have been made to utilize electromagnets to provide driving force to provide reciprocal motion of pistons to drive an engine. U.S. Patent No. 4,317,058 discloses a modified internal combustion engine. The pistons are replaced with permanent magnet pistons and an electromagnet is disposed at the outer end of each cylinder. The electromagnets are energized to generate a magnetic field that will repel the permanent magnet pistons.
Pat. No. 6,552,450 discloses a reciprocating engine including a piston and a cylinder. An electromagnet is connected to the cylinder and another electromagnet is connected to the piston. Thus, the electromagnet connected to the piston moves with the piston.

Pat. No. 3,676,719 discloses an electromagnetic motor that includes electromagnetic solenoids that are used to repel cores of ferrous metal to drive a gear. The drive gears drive a pinion gear which rotates a drive shaft that drives an alternator or generator through a pulley and belt assembly. The rotation of the drive shaft operates the alternator, which produces electrical energy to at least partially replenish the energy stored in the batteries.

The present invention is to provide an electromagnetic reciprocating engine that can be energized to repulse permanent magnets in order to provide the force necessary to drive a Crankshaft of a car, and supply current for electrical systems in the car, while eliminating the need for a combustion tight seal and conventional complexities of combustion engines.

**SUMMARY OF THE INVENTION**

The present invention provides an engine that includes an electromagnet that can be energized to produce a magnetic field. When energized, the electromagnet has opposing magnetic poles, one pole at one end and an opposite pole at the opposite end. The electromagnet has a first magnetic pole orientation in a first energized state and a second magnetic pole orientation in a second energized state.

In one aspect, the engine of the present invention includes a Crankshaft and a non-magnetic rigid support frame coupled to the Crankshaft. The frame is mounted for oscillatory stroke movement relative to and in the direction of the axis of the electromagnet. Two permanent magnets are affixed to the frame and on either side of the electromagnet. Each of the permanent magnets is oriented to present the same magnetic pole to each respective end of the electromagnet. The permanent magnets are spaced from each other by a distance approximately equal to the distance between the first and second ends of the electromagnet plus the distance of stroke movement of the frame.

A sensor is coupled to the Crankshaft to sense the position of the Crankshaft and output a signal as a function of the Crankshaft position. A timing circuit is included to control the energized state of the electromagnet. The timing circuit switches the energized state of the electromagnet depending on the position of the Crankshaft which is sensed by the sensor. Thus, the timing circuit causes the orientation of the magnetic field of the electromagnet to change.

When the electromagnet is energized, one of the permanent magnets is repelled and the other is attracted. This causes the frame to move which, in turn, causes the Crankshaft to rotate. When the frame has moved so that the permanent magnet that is being attracted is close to the electromagnet, the timing circuit switches the energized state of the electromagnet in response to the sensor output signal. This changes the magnetic pole orientation of the electromagnet, which causes the close permanent magnet that was previously being attracted, to be repelled. Thus, the frame is moved in the opposite direction. This process of switching the energized state of the electromagnet is repeated, which results in reciprocating movement of the frame. The reciprocating movement of the frame causes the Crankshaft to rotate.

In more particular aspects, an alternator is coupled to the Crankshaft to convert at least a portion of the rotational energy of the Crankshaft into electrical energy.

In still more particular aspects, a rechargeable power storage device is electrically connected to the timing circuit to supply power to energize the electromagnets. The alternator also provides electrical energy to recharge the rechargeable power storage device.

In another aspect, the engine of the present invention includes a Crankshaft, first and second guide rails, and a piston coupled to the Crankshaft. The piston includes engagement portions that are formed complementary to the guide rails and are engaged with the two guide rails so the piston is constrained to reciprocating oscillatory stroke movement. A permanent magnet is affixed to the piston. A sensor is coupled to the Crankshaft to sense the position of the Crankshaft and output a signal as a function of the Crankshaft position. A timing circuit is included to energize the electromagnet in response to the sensor output signal.

When the electromagnet is energized a force is exerted on the permanent magnet, which causes the piston to move.

These and other aspects, features, and problems addressed by the invention can be further appreciated with reference to the discussion of certain embodiments and the drawings of such embodiments.

**BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a view showing an electromagnetic engine according to one embodiment of the invention;
FIG. 2 is a view thereof in one state;
FIG. 3 is a view thereof in a second state;
FIG. 4 is a view thereof in a third state;
FIG. 5 is a view thereof in a fourth state;
FIG. 6 is a view showing an electromagnetic engine according to another embodiment; and
FIG. 7 is a cross-sectional view along line 7-7 of FIG. 6.

**DETAILED DESCRIPTION OF CERTAIN EMBODIMENTS**

Referring to the drawings in detail, an electromagnetic engine 10 of one embodiment of the invention includes an electromagnet 12 and a frame 18 mounted for oscillatory movement. The frame 18 is coupled to a Crankshaft 20. First and second permanent magnets 14 and 16 are affixed to the frame 18 and are positioned on opposite ends of the electromagnet 12, preferably in axial alignment with the electromagnet 12.
The electromagnetic engine 10 includes batteries 22, which provide a rechargeable power source. The batteries 22 are electrically connected through a switching circuit 24, an accelerator circuit 26, and a timing circuit 28 to the electromagnet 12. The batteries 22 are also electrically connected through the switching circuit 24 to a starter motor 30. As seen in FIG. 1, the batteries are also electrically connected through the switching circuit 24 to an alternator 32.

The electromagnetic engine 10 is driven by a magnetic field produced by the electromagnet 12. When electrical current is supplied to the electromagnet 12 it becomes energized and produces a magnetic field having opposite poles. The permanent magnets 14 and 16 are attached to the frame 18 and are both orientated to present the same magnetic pole toward the electromagnet 12. As seen in FIG. 1, the permanent magnets 14 and 16 are both presenting their north poles toward the electromagnet 12. When the electromagnet 12 is energized, depending on the orientation of the magnetic field, one of the permanent magnets 14 or 16 is repelled and the other permanent magnet is attracted. The direction of the electrical current supplied to the electromagnet 12 can be reversed, which reverses the orientation of the magnetic field. Thus, the permanent magnets 14 and 16 can be repelled and attracted by the electromagnet 12.

The attraction and repulsion of the permanent magnets 14, 16 that are attached to the frame 18 causes the frame 18, which is made of a non-magnetic material, to oscillate. The electromagnet 12 is fixed in position and does not move. The electromagnet 12 can be mounted to a non-magnetic support, which can be part of the engine block. The fixed mounting of the electromagnet provides many great advantages such as eliminating the problems of providing electrical power to the electromagnet through wires. Since the electromagnet is stationary and does not reciprocate like the frame 18, the problems of wire chaffing and fatigue are eliminated. The magnets that do move with the frame 18, magnets 14, 16, are permanent magnets, which do not require an electrical power connection.

The frame 18 is connected to a Crankshaft 20. The oscillation of the frame 18 causes the Crankshaft 20 to rotate. The frame 18 can be mounted on tracks or guides that are connected to a support, which can be the same support or engine block that the electromagnet is mounted to so that the frame 18 is free to reciprocate. The electromagnetic engine 10 may be used in an automobile, in which case, the Crankshaft 20 would be used to drive the car.

The switching circuit 24 directs the flow of electrical power from the batteries 22 depending on the operational state of the electromagnetic engine 10. When the engine is being started, electrical power is directed to the starter motor 30. The starter motor 30 is connected to the Crankshaft 20. The starter motor 30 rotates the Crankshaft 20, which is connected to the frame 18, in order to move frame 18 so that the permanent magnets 14, 16 are in an optimal position when the electromagnet 12 is energized. The starter motor 30 is much like a starter motor found in a combustion engine that moves the pistons through the engine stroke so the engine can be started.

As can be seen in FIG. 1, a position sensor 34 is provided in proximity to the Crankshaft 20. The position sensor 34 senses the rotational position of the Crankshaft 20, which relates to the position of the frame and the permanent magnets 14, 16 with respect to the electromagnet 12. As one example, the position sensor can comprise an optical encoder or a magnetic encoder that generates signals based upon rotation of markings positioned on and around the Crankshaft 20. It has been recognized that the environment of the engine may be very dirty, especially when the engine 10 is used in a car. Thus, to overcome the problems associated with dirt which may affect the reliability of an optical encoder, a magnetic encoder may be used. The sensor 34 is in communication with the timing circuit 28 so that the signals relating to the position of the Crankshaft can be provided to the timing circuit 28. The signals from sensor 34 can be used by the timing circuit to determine the position of the Crankshaft 20 and frame 18.

Depending on the positional information, the timing circuit 28 controls when the electromagnet 12 is energized. The timing circuit 28 also controls the direction of current flow to the electromagnet in order to control the orientation of the magnetic field of the electromagnet 12. The timing circuit can generate a pulse train that energizes the electromagnet or can drive a further circuit [not shown] that latches signals from the timing circuit and drives a current into the coil of the electromagnet.

FIGS. 2-5 show different positional states of the frame and Crankshaft as the frame progresses through its stroke. The electromagnet 12 is also shown in different states of energization such that opposite poles 36 and 38 of the electromagnet have different orientations, which is controlled by the timing circuit 28 as a function of the position of the Crankshaft and frame. FIG. 2 shows the frame 18 near the beginning of its stroke cycle in a position such that permanent magnet 14 is proximate to the electromagnet 12. The electromagnet 12 is energized by timing circuit 28 such that the pole 36, which is closest to permanent magnet 14, is north. This causes the permanent magnet 14, which is oriented to present its north pole toward the electromagnet 12, to be repelled causing the frame 18 to move.

As shown in FIG. 3, the frame 18 has moved and progressed in its stroke so that permanent magnet 16 is proximate to pole 38 of the electromagnet 12. During this movement of the frame 18, the timing circuit 28 has maintained the electromagnet 12 in the same magnetic orientation. Thus, pole 38 still has a south orientation. Therefore, as magnet 14 is being repelled, magnet 16 is being attracted. This arrangement helps improve the efficiency of the electromagnetic engine 10 because rather than only relying on one pole of the electromagnet to do the work, both poles are utilized. Therefore, one of the poles of the magnetic field produced by the electromagnet 12 is not wasted, both are used to move the frame 18.

As the distance between a permanent magnet and the electromagnet increases, the magnetic force between them decays and as the distance between a permanent magnet and the electromagnet decreases, the magnetic force between them
increases according to known physical principles. Accordingly, as permanent magnet 14 is being repelled by the electromagnet 12, the magnitude of the force of repulsion decreases as the distance between the permanent magnet 14 and the electromagnet 12 increases. However, the distance between the permanent magnet 16 and the electromagnet 12 is simultaneously decreasing, which results in an increase in the force of attraction between the permanent magnet 16 and the electromagnet 12. Thus, as the frame 18 moves through its stroke, the force between one of the permanent magnets and the electromagnet is decreasing as the force between the other permanent magnet and the electromagnet is increasing.

As frame 18 continues to progress through its stroke and the Crankshaft 20 rotates past the center position, the timing circuit 28 reverses the direction of the current supplied to the electromagnet 12 which reverses the orientation of the magnetic field of the electromagnet as shown in FIG. 4. Pole 38, which is proximate to permanent magnet 16, now has a north orientation, which causes magnet 16 to be repelled.

The timing of the change in direction of the current of the electromagnet, which results in a reversal of the orientation of the magnetic field of the opposite pole electromagnet, can be timed for maximum efficiency. As the Crankshaft 20 approaches the top dead center position with one of the permanent magnets approaching its closest position with respect to the electromagnet, the timing circuit can initiate the reversal of the current flow to the electromagnet. Since there will be some small delay in the reversal of the magnetic field orientation, there will be a transient phase in the electromagnet. The timing circuit is timed so the transient phase occurs as the Crankshaft is approaching the top dead center position so the electromagnet will be energized to repel the permanent magnet on the frame after passing top dead center for maximum efficiency. The duration of the transient phase should be reduced as much as possible because this occurs when the distance between one of the permanent magnets and the electromagnet is smallest, which is when the force between the electromagnet and the permanent magnet is strongest. Thus, starting the reversal of orientation of the magnetic field too late will result in loss of efficiency of the repulsion between the magnets as the frame changes direction in its stroke.

As shown in FIG. 5, the frame 18 has progressed in its stroke and moved so that permanent magnet 14 is now again proximate to pole 36 of the electromagnet 12. During this movement of the frame 18, the timing circuit 28 has maintained the electromagnet 12 in the same magnetic orientation. Thus, pole 36 is still south orientation. Therefore, as magnet 16 is being repelled, magnet 14 is being attracted. At this point the Crankshaft 20 has nearly completed a full rotation and the frame 18 nearly a full stroke cycle. As the Crankshaft rotates past the center position, the timing circuit 28 will again reverse the direction of the current supplied to the electromagnet 12 which reverses the orientation of the magnetic field of the electromagnet 12 causing the direction of the stroke of the frame 18 to change. Thus, the frame 18 can be oscillated, causing the Crankshaft 20 to rotate.

The stroke distance is approximately equal to the distance between the permanent magnets 14 and 16 and the ends of the electromagnet 12. The stroke distance is "approximately" equal, meaning it is equal to that distance plus assembly tolerances for maximum efficiency so that the permanent magnets and the electromagnet come as close as possible without impacting each other as the frame moves through its stroke cycle. Some efficiency in terms of use of the magnetic field strength to repel the permanent magnets can be sacrificed by slightly increasing the distance between the permanent magnets and the electromagnet, e.g., when there are multiple frame/electromagnet assemblies driving the Crankshaft.

Further, multiple frame/electromagnet assemblies attached to the Crankshaft at a different stroke offset in order to improve the balance of the engine. For example, as one frame is in its down-stroke, another frame can be in the up-stroke.

As shown in FIG. 1, an accelerator circuit 26 is included. The accelerator circuit 26 controls the amount of power being supplied to the electromagnet 12. By controlling the amount of power supplied to the electromagnet 12, the strength of the magnetic field produced is governed. In turn, the force of repulsion and attraction of the permanent magnets 14, 16 is influenced. The change in the electromagnetic field varies the speed at which the frame 18 is oscillated, the speed at which the Crankshaft 20 rotates, and the power transferred to the Crankshaft over time. Thus, the speed of the electromagnetic engine 10 can be controlled using the accelerator circuit. In the case the electromagnetic engine is used to drive an automobile, the accelerator circuit 26 is in communication with an accelerator pedal used by the driver. Thus, using the accelerator pedal the driver can control the speed at which the automobile is traveling.

In particular, the accelerator circuit controls the amount of power being supplied to the electromagnet's timing circuit 28. In one implementation, the amplitude of the pulse train produced by the timing circuit is increased to cause a greater current to flow in the coil of the electromagnet and cause a concomitant change in the magnetic field produced. The stronger the magnetic field, the greater [and faster] the repulsion and attraction of the electromagnet to the permanent magnets 14, 16.

The electromagnetic engine 10 also includes an alternator 32 connected to the Crankshaft 20. The Crankshaft 20 is connected to the alternator 32 in order to spin the alternator 32 to produce electrical power. The alternator 32 is electrically connected to batteries 22 through switching circuit 24. The alternator 32 converts at least a portion of the energy of the engine and rotating Crankshaft 22 into electrical energy. The electrical energy is used to at least partially recharge the batteries 22. For example, if the engine 10 were used to drive an automobile, when the automobile is traveling downhill or is at idle, the alternator 32 replenishes the batteries 22. The electrical energy may also be passed through a voltage regulator before being sent to the batteries.

FIGS. 6 and 7 illustrate another mounting arrangement of an electromagnet 112 and a piston 140. The electromagnet 112 is mounted in a fixed position and does not move relative to the
piston 142. The nonmagnetic piston 142 is provided with engagement portions 146 that are formed complementary to guide rails 144. The guide rails 144 are fixed in position and do not move relative to the piston. For example, the guide rails 144 and the electromagnet 112 can be mounted to the same non-magnetic support, which can be part of an engine block. As shown in FIG. 7, the engagement portions 146 have a concave shape that is complementary to the convex tubular shaped guide rails 144. The complementarily formed engagement portions 146 and the non-magnetic guide rails 144 constrain the movement of the piston 140 to a single degree of freedom [e.g. one direction of movement]. Thus, the piston 140 can move in a linear direction when the permanent magnet 142 is repulsed by the electromagnet 112.

The use of the piston 140 and guide rails 144 to constrain the piston is possible because of the use of magnetic force to drive the piston 140. There is no need to provide a compression tight seal around piston 140 in order to cause the piston 140 to move, as in piston and cylinder arrangements of internal combustion engines. Thus, there is no need to provide a sealing engagement between the perimeters of the piston moving within the cylinder, which is a source of friction. Rather, the movement of the piston 140 only needs to be constrained to linear movement and this can be accomplished with guide rails 144 while the piston can be exposed to no more than ambient pressure. The contacting surface between the moving piston 140 and the guide rails 144 can be smaller relative to a piston and cylinder arrangement. In this way, friction forces can be reduced, leading to a more efficient engine. As well, the guide rails are preferably non-magnetic and disposed so as to be free of any influence on the permanent magnet. As seen in FIG. 7, the contacting surfaces between the guide rails and the pistons is limited and does not extend completely around the perimeter of the piston, thus reducing the friction surface between the piston and the guide rails. Further, without the need for compression sealing, complex sealing rings and other parts can be eliminated.

When the electromagnet 112 is energized, the magnetic field repulses the permanent magnet 142 that is mounted on the piston 140. As similarly discussed above, this causes the piston to move, which causes the Crankshaft 122 to rotate. The electromagnet 112 can be energized such that it only repulses the permanent magnet 142. Thus, the electromagnet 112 can be intermittently energized to only provide power in the down-stroke of the piston 140. The direction of the current of the electromagnet 112 can also be cyclically reversed such that the electromagnet 112 attracts the permanent magnet 142 in the upstroke of the piston 140 and repulses the permanent magnetic 142 in the down-stroke of the piston.

Magnetic shielding optionally can be provided around the magnets of the engine. The magnetic shielding provides protection to the electrical components of the engine and any other devices from interference from the magnets. The magnetic shielding deflects the magnetic flux to protect sensitive components while allowing the magnetic flux to operate to drive the pistons of the engine.

From the foregoing it is apparent that the present invention provides an electromagnetic engine which may be produced as a power source for automobiles, trucks, ships, recreational vehicles and the like.

With the hydrocarbon fuel shortage that is presently upon us, the present invention could provide an alternative to internal combustion engines.

Whereas the present invention has been described in particular relation to the drawings attached hereto, other and further modifications apart from those shown or suggested herein may be made within the spirit and scope of the invention.
7.5 Appendix E – Systems Physics

Over the year’s people have been taught “A perpetual motion machine is impossible”. It is against the Law of Conservation of Energy. The understanding of the Laws of Physics has been changing over time. New understandings have been researching and proven for years. That law has been proven wrong with in pacific conditions. There are three examples of the violation of that law.

The Electromagnetic Reciprocating Engine is another example. The primary difference is the Crankshaft.

7.5.1 Third Law Of Motion

Newton's Third Law of Motion states, "For every action, there is an equal and opposite reaction." This law describes what happens to a body when it exerts a force on another body. Forces always occur in pairs, so when one body pushes against another, the second body pushes back just as hard. The mutual forces of action and reaction between two bodies are equal, opposite and collinear. [https://www.livescience.com/46558-laws-of-motion.html](https://www.livescience.com/46558-laws-of-motion.html)

The Third Law states that all forces between two objects exist in equal magnitude and opposite direction: if one object A exerts a force FA on a second object B, then B simultaneously exerts a force FB on A, and the two forces are equal in magnitude and opposite in direction: FA = −FB. The Third Law means that all forces are interactions between different bodies, or different regions within one body, and thus that there is no such thing as a force that is not accompanied by an equal and opposite force. In some situations, the magnitude and direction of the forces are determined entirely by one of the two bodies, say Body A; the force exerted by Body A on Body B is called the "action", and the force exerted by Body B on Body A is called the "reaction". This law is sometimes referred to as the action-reaction law, with FA called the "action" and FB the "reaction". In other situations the magnitude and direction of the forces are determined jointly by both bodies and it isn't necessary to identify one force as the "action" and the other as the "reaction". The action and the reaction are simultaneous, and it does not matter which is called the action and which is called reaction; both forces are part of a single interaction, and neither force exists without the other.

The two forces in Newton's Third Law are of the same type (e.g., if the road exerts a forward frictional force on an accelerating car's tires, then it is also a frictional force that Newton's Third Law predicts for the tires pushing backward on the road). [https://en.wikipedia.org/wiki/Newton%27s_laws_of_motion](https://en.wikipedia.org/wiki/Newton%27s_laws_of_motion)

7.5.2 Lorentz Force Law

In physics (specifically in electromagnetism) the Lorentz force (or electromagnetic force) is the combination of electric and magnetic force on a point charge due to electromagnetic fields.

7.5.3 Coulomb's Law

Coulomb's Law states that "like charges repel, and unlike charges attract," but the more complete form determines the strength of the Coulomb force; Coulomb's Law shows how strong the push or pull (the force) is between two points of charge, like a proton and electron in an atom. Coulomb's Law is the simplest case of the electromagnetic force, one of the four fundamental forces. Most everyday forces like friction, the normal force, and air drag are residual forms of the Coulomb force (all of the charges add up to a complicated situation that leaves the friction between two surfaces, for example). Mathematically, Coulomb's Law is very similar to Newton's Law Of Gravity.

The law states that the electric force of one charge on another depends on the magnitude of the charges, and the square of the distance r between them.

7.5.4 Mechanical Advantage

Mechanical Advantage is a measure of the force amplification achieved by using a tool, mechanical device or machine system. The device preserves the input power and simply trades off forces against movement to obtain a desired amplification in the output force. The model for this is The Law Of The Lever. Machine components designed to manage forces and movement in this way are called mechanisms. An ideal mechanism transmits power without adding to or subtracting from it. This means the ideal mechanism does not include a power source, is frictionless, and is constructed from rigid bodies that do not deflect or wear. The performance of a real system relative to this ideal is expressed in terms of efficiency factors that take into account departures from the ideal. [https://en.wikipedia.org/wiki/Mechanical_advantage](https://en.wikipedia.org/wiki/Mechanical_advantage)

7.5.5 Law Of The Lever

A Lever is a simple machine consisting of a beam or rigid rod pivoted at a fixed hinge, or fulcrum. A Lever is a rigid body capable of rotating on a point on itself. On the basis of the location of fulcrum, load and effort, the Lever is divided into three types. It is one of the six simple machines identified by Renaissance scientists. A Lever amplifies an input force to provide a greater output force, which is said to provide leverage. The ratio of the output force to the input force is the Mechanical Advantage Of The Lever.

A Lever is a beam connected to ground by a hinge, or pivot, called a fulcrum. The ideal Lever does not dissipate or store energy, which means there is no friction in the hinge or bending in the beam. In this case, the power into the Lever equals the power out, and the ratio of output to input force is given by the ratio of the distances from the fulcrum to the points of application of these forces. This is known as the Law Of The Lever.
The Mechanical Advantage of a lever can be determined by considering the balance of moments or torque, \( T \), about the fulcrum.

\[ T_1 = F_1 \cdot a, \quad T_2 = F_2 \cdot b \]

where \( F_1 \) is the input force to the lever and \( F_2 \) is the output force. The distances \( a \) and \( b \) are the perpendicular distances between the forces and the fulcrum.

Since the moments of torque must be balanced, \( T_1 = T_2 \). So, \( F_1 \cdot a = F_2 \cdot b \).

The mechanical advantage of the lever is the ratio of output force to input force,

\[ MA = \frac{F_2}{F_1} = \frac{a}{b} \]

This relationship shows that the mechanical advantage can be computed from ratio of the distances from the fulcrum to where the input and output forces are applied to the lever, assuming no losses due to friction, flexibility or wear. This remains true even though the horizontal distance (perpendicular to the pull of gravity) of both \( a \) and \( b \) change (diminish) as the lever changes to any position away from the horizontal. [https://en.wikipedia.org/wiki/Lever](https://en.wikipedia.org/wiki/Lever)

### 7.5.6 Law Of Conservation Of Energy

In physics and chemistry, the **Law Of Conservation Of Energy** states that the total energy of an Isolated System remains constant; it is said to be conserved over time. This law means that energy can neither be created nor destroyed; rather, it can only be transformed or transferred from one form to another.

For instance, chemical energy is converted to Kinetic Energy when a stick of dynamite explodes. If one adds up all the forms of energy that were released in the explosion, such as the Kinetic Energy and Potential Energy of the pieces, as well as heat and sound, one will get the exact decrease of chemical energy in the combustion of the dynamite.

Classically, conservation of energy was distinct from conservation of mass; however, special relativity showed that mass is related to energy and vice versa by \( E = mc^2 \), and science now takes the view that mass–energy is conserved.

A consequence of the Law Of Conservation Of Energy is that a perpetual motion machine of the first kind cannot exist, that is to say, no system without an external energy supply can deliver an unlimited amount of energy to its surroundings. [https://en.wikipedia.org/wiki/Conservation_of_energy](https://en.wikipedia.org/wiki/Conservation_of_energy)

### 7.5.7 Perpetual Motion Machine

**Perpetual Motion** is motion of bodies that continues indefinitely. A perpetual motion machine is a hypothetical machine that can do work indefinitely without an energy source. This kind of machine is impossible, as it would violate the First Or Second Law Of Thermodynamics.

These Laws Of Thermodynamics apply regardless of the size of the system. For example, the motions and rotations of celestial bodies such as planets may appear perpetual, but are actually subject to many processes that slowly dissipate their Kinetic Energy, such as solar wind, interstellar medium resistance, gravitational radiation and thermal radiation, so they will not keep moving forever.

There is a scientific consensus that perpetual motion in an Isolated System violates either the First Law Of Thermodynamics, the Second Law Of Thermodynamics, or both. The First Law Of Thermodynamics is a version of the Law Of Conservation Of Energy. The second law can be phrased in several different ways, the most intuitive of which is that heat flows spontaneously from hotter to colder places; relevant here is that the law observes that in every macroscopic process, there is friction or something close to it; another statement is that no heat engine (an engine which produces work while moving heat from a high temperature to a low temperature) can be more efficient than a Carnot heat engine operating between the same two temperatures.

In other words:

In any Isolated System, one cannot create new energy (Law Of Conservation Of Energy). As a result, the thermal efficiency—the produced work power divided by the input heating power—cannot be greater than one.

The output work power of heat engines is always smaller than the input heating power. The rest of the heat energy supplied is wasted as heat to the ambient surroundings. The thermal efficiency therefore has a maximum, given by the Carnot efficiency, which is always less than one.

The efficiency of real heat engines is even lower than the Carnot efficiency due to irreversibility arising from the speed of processes, including friction.

Statements 2 and 3 apply to heat engines. Other types of engines which convert e.g. mechanical into electromagnetic energy, cannot operate with 100% efficiency, because it is impossible to design any system that is free of energy dissipation.

Machines which comply with both Laws Of Thermodynamics by accessing energy from unconventional sources are sometimes referred to as perpetual motion machines, although they do not meet the standard criteria for the name. By way of example, clocks and other low-power machines, such as Cox’s timepiece, have been designed to run on the differences in barometric pressure or temperature between night and day. These machines have a source of energy, albeit one which is not readily apparent so that they only seem to violate the Laws Of Thermodynamics.

Even machines which extract energy from long-lived sources - such as ocean currents - will run down when their energy sources inevitably do. They are not perpetual motion machines because they are consuming energy from an external source and are not isolated systems.

One classification of perpetual motion machines refers to the particular Law Of Thermodynamics the machines purport to violate:
A perpetual motion machine of the first kind produces work without the input of energy. It thus violates the First Law Of Thermodynamics: the Law Of Conservation Of Energy.

A perpetual motion machine of the second kind is a machine which spontaneously converts thermal energy into mechanical work. When the thermal energy is equivalent to the work done, this does not violate the law of conservation of energy. However, it does violate the more subtle second law of thermodynamics (see also entropy). The signature of a perpetual motion machine of the second kind is that there is only one heat reservoir involved, which is being spontaneously cooled without involving a transfer of heat to a cooler reservoir. This conversion of heat into useful work, without any side effect, is impossible, according to the Second Law Of Thermodynamics.

A perpetual motion machine of the third kind is usually (but not always) self-published source] defined as one that completely eliminates friction and other dissipative forces, to maintain motion forever (due to its mass inertia). (Third in this case refers solely to the position in the above classification scheme, not the Third Law Of Thermodynamics.) It is impossible to make such a machine, as dissipation can never be completely eliminated in a mechanical system, no matter how close a system gets to this ideal (see examples in the Low Friction section).

https://en.wikipedia.org/wiki/Perpetual_motion

7.5.8 Laws Of Thermodynamics

The four Laws Of Thermodynamics define fundamental physical quantities (temperature, energy, and entropy) that characterize thermodynamic systems at thermal equilibrium. The laws describe how these quantities behave under various circumstances, and preclude the possibility of certain phenomena (such as perpetual motion).

The First Law Of Thermodynamics is a version of the Law Of Conservation Of Energy, adapted for thermodynamic systems. The Law Of Conservation Of Energy states that the total energy of an Isolated System is constant; energy can be transformed from one form to another, but can be neither created nor destroyed. The first law is often formulated.

The Second Law Of Thermodynamics states that the total entropy of an Isolated System can never decrease over time. The total entropy of a system and its surroundings can remain constant in ideal cases where the system is in thermodynamic equilibrium, or is undergoing a (fictive) reversible process. In all processes that occur, including spontaneous processes, the total entropy of the system and its surroundings increases and the process is irreversible in the thermodynamic sense. The increase in entropy accounts for the irreversibility of natural processes, and the asymmetry between future and past.


7.5.9 Lenz’s Law

Lenz’s Law, in electromagnetism, statement that an induced electric current flows in a direction such that the current opposes the change that induced it. This law was deduced in 1834 by the Russian physicist Heinrich Friedrich Emil Lenz (1804–65).

Thrusting a pole of a permanent bar magnet through a coil of wire, for example, induces an electric current in the coil; the current in turn sets up a magnetic field around the coil, making it a magnet. Lenz’s Law indicates the direction of the induced current. Because like magnetic poles repel each other, Lenz’s Law states that when the north pole of the bar magnet is approaching the coil, the induced current flows in such a way as to make the side of the coil nearest the pole of the bar magnet itself a north pole to oppose the approaching bar magnet. Upon withdrawing the bar magnet from the coil, the induced current reverses itself, and the near side of the coil becomes a south pole to produce an attracting force on the receding bar magnet.

A small amount of work, therefore, is done in pushing the magnet into the coil and in pulling it out against the magnetic effect of the induced current. The small amount of energy represented by this work manifests itself as a slight heating effect, the result of the induced current encountering resistance in the material of the coil. Lenz’s Law upholds the general principle of the Conservation Of Energy. If the current were induced in the opposite direction, its action would spontaneously draw the bar magnet into the coil in addition to the heating effect, which would violate conservation of energy.

7.5.10 Faraday’s Law Of Induction

Faraday’s Law Of Induction (shortly called Faraday’s law throughout this document) is a basic law of electromagnetism predicting how a magnetic field will interact with an electric circuit to produce an electromotive force (EMF)—a phenomenon called electromagnetic induction. It is the fundamental operating principle of transformers, inductors, and many types of electrical motors, generators and solenoids.

The Maxwell–Faraday equation (listed as one of Maxwell’s equations) describes the fact that a spatially varying (and also possibly time-varying, depending on how a magnetic field varies in time) electric field always accompanies a time-varying magnetic field, while Faraday’s law states that there is EMF (electromotive force, defined as electromagnetic work done on a unit charge when it has traveled one round of a conductive loop) on the conductive loop when the magnetic flux through the surface enclosed by the loop varies in time.

7.5.11 Electrical Energy

Electrical Energy is energy derived from Electric Potential Energy or Kinetic Energy. When used loosely, “Electrical Energy” refers to energy that has been converted from Electric Potential Energy. This energy is supplied by the combination of electric current and Electric Potential that is delivered by an electrical circuit (e.g., provided by an electric power utility). At the point that this Electric Potential Energy has been converted to another type of energy, it ceases to be Electric Potential Energy. Thus, all Electrical Energy is potential energy before it is delivered to the end-use. Once converted from Potential Energy, Electrical Energy can always be called another type of energy (heat, light, motion, etc.)
7.5.12 Magnetic Energy

Magnetic Energy is Potential Energy that is stored in a magnetic field.

A magnet is a type of material that produces a magnetic field. A magnet is characterized by its two poles; North and South. These poles create a magnetic field that flows from the North to the South pole.

Types of Magnets:

- **Permanent Magnets**, typically called ferromagnetic, are materials that do not easily lose their magnetism once they are magnetized. Materials can be magnetized by coming into contact with an external magnetic field. This process can be accelerated by first heating and then cooling the material. Such materials are also referred to as hard magnets.

- **Electromagnets** are very strong magnets, used in devices such as computers, televisions and motors. They are made by placing a metal core inside a coil of wire that is carrying an electrical current. The electricity going through the wire produces a magnetic field. While the electric current is flowing, the core acts as a strong magnet.

7.5.13 Kinetic Energy

In physics, the Kinetic Energy of an object is the energy that it possesses due to its motion. It is defined as the work needed to accelerate a body of a given mass from rest to its stated velocity. Having gained this energy during its acceleration, the body maintains this Kinetic Energy unless its speed changes. The same amount of work is done by the body when decelerating from its current speed to a state of rest.

7.5.14 Potential Energy

In physics, Potential Energy is the energy held by an object because of its position relative to other objects, stresses within itself, its electric charge, or other factors.

Potential Energy is closely linked with forces. If the work done by a force on a body that moves from A to B does not depend on the path between these points, then the work of this force measured from A assigns a scalar value to every other point in space and defines a scalar potential field.

7.5.15 Mechanical Energy

In physical sciences, Mechanical Energy is the sum of Potential Energy and Kinetic Energy. It is the energy associated with the motion and position of an object. The principle of Conservation Of Mechanical Energy states that in an isolated system that is only subject to conservative forces, the Mechanical Energy is constant. If an object is moved in the opposite direction of a conservative net force, the Potential Energy will increase and if the speed (not the velocity) of the object is changed, the Kinetic Energy of the object is changed as well. In all real systems, however, non-conservative forces, like frictional forces, will be present, but often they are of negligible values and the Mechanical Energy's being constant can therefore be a useful approximation.

7.5.16 Electromagnetic Force

Electromagnetic Forces act between charged particles. Opposite charges attract, while objects with the same charge will repel each other. Many "everyday forces" are truly electromagnetic forces on an atomic level added up to a large scale. For example, pushing a box exerts a force on it because the negatively charged electrons found in atoms in the hand pushing repel the negatively charged electrons in the atoms of the box. Electric fields and magnetic fields involve these interactions.

7.5.17 Crankshaft Forces

There are two different load sources acting on the Crankshaft. Inertia of rotating components (e.g. connecting rod) applies forces to the Crankshaft and this force increases with the increase of engine speed. ... The second load source is the force applied to the Crankshaft due to gas combustion in the cylinder.

7.5.18 Common Renewable Energy

Common Renewable Energy. The most common definition is that Renewable Energy is from an energy resource that is replaced rapidly by a natural process such as power generated from the sun or from the wind. Most renewable forms of energy, other than geothermal and tidal power, ultimately come from the Sun.

7.5.19 Electrical Battery

Batteries convert chemical energy directly to electrical energy. In many cases, the electrical energy released is the difference in the cohesive or bond energies of the metals, oxides, or molecules undergoing the electrochemical reaction. For instance, energy can be stored in Zn or Li, which are high-energy metals because they are not stabilized by d-electron bonding, unlike transition metals. Batteries are designed such that the energetically favorable redox reaction can occur only if electrons move through the external part of the circuit.

A battery consists of some number of voltaic cells. Each cell consists of two half-cells connected in series by a conductive electrolyte containing metal cations. One half-cell includes electrolyte and the negative electrode, the electrode to which anions (negatively charged ions) migrate; the other half-cell includes electrolyte and the positive electrode, to which cations (positively charged ions) migrate. Cations are reduced (electrons are added) at the cathode, while metal atoms are oxidized (electrons are removed) at the anode. Some cells use different electrolytes for each half-cell; then a separator is used to prevent mixing of the electrolytes while allowing ions to flow between half-cells to complete the electrical circuit.
Each half-cell has an electromotive force (emf, measured in volts) relative to a standard. The net emf of the cell is the difference between the emfs of its half-cells. Thus, if the electrodes have emfs $E_1$, in other words, the net emf is the difference between the reduction potentials of the half-reactions.

The electrical driving force or $\Delta V_{\text{bat}}$ across the terminals of a cell is known as the terminal voltage (difference) and is measured in volts. The terminal voltage of a cell that is neither charging nor discharging is called the open-circuit voltage and equals the emf of the cell. Because of internal resistance, the terminal voltage of a cell that is discharging is smaller in magnitude than the open-circuit voltage and the terminal voltage of a cell that is charging exceeds the open-circuit voltage. An ideal cell has negligible internal resistance, so it would maintain a constant terminal voltage of $E$ until exhausted, then dropping to zero. If such a cell maintained 1.5 volts and produce a charge of one coulomb then on complete discharge it would have performed 1.5 joules of work. In actual cells, the internal resistance increases under discharge and the open-circuit voltage also decreases under discharge. If the voltage and resistance are plotted against time, the resulting graphs typically are a curve; the shape of the curve varies according to the chemistry and internal arrangement employed.

The voltage developed across a cell's terminals depends on the energy release of the chemical reactions of its electrodes and electrolyte. Alkaline and zinc–carbon cells have different chemistries, but approximately the same emf of 1.5 volts; likewise NiCd and NiMH cells have different chemistries, but approximately the same emf of 1.2 volts. The high electrochemical potential changes in the reactions of lithium compounds give lithium cells emfs of 3 volts or more.
7.6 Appendix F – Law Changing Research

7.6.1 Example 1

Dutch Electrical Engineer YouTube Videos Violate Law of Conservation of Energy

By Potential Difference Inc.
Dated: Nov 12, 2011


Newton's third law states that, "for every action there is an equal and opposite reaction" and this law of physics is explained in electric generator terms through Lenz's Law... When a generator delivers power to a load, the generator creates magnetic "friction" [an equal and opposite reaction] which decelerates the system and as a result more power must be added back into the system to maintain the power across the load.

As it turns out Newton's Third Law does not apply to generators if certain operating conditions are met. This also means that ultimately the Law of Conservation of Energy also does not apply to electric generators under certain operating conditions either. MIT Professor Dr. Marcus Zahn and Ottawa University Power Engineering Professor Dr. Riahd Habash have also confirmed the validity of the self-accelerating generator phenomenon many times while supervising the development of the technology at the University of Ottawa for over two and a half years.

DUTCH ELECTRICAL ENGINEER SELF-ACCELERATING GENERATOR EXPERIMENT ON YOU-TUBE

http://www.youtube.com/watch?v=B750RHMM9hTc

Independent Dutch Electrical Engineer's video and corresponding mathematical explanations on You-Tube prove that this is indeed so and that mainstream science has had it wrong for many years.

SELF-ACCELERATING GENERATOR MATHEMATICAL EXPLANATION

http://www.youtube.com/watch?v=b9bCAMWetL8

WHAT THIS MEANS FOR WORLDWIDE ENERGY PRODUCTION

In today's conventional generator system, the more output power required by the load the more input power [or torque] must be fed back into the system to keep the generator spinning and producing usable electric power.

By reversing Newton's Third Law electric generators can now supply energy with a reduction in input power when delivering power to a load at a substantial cost and input energy savings for an energy starved planet because the generators can now create their own torque [internally] without any additional input energy power [or cost] increase.

Thane C. Heins
President

Potential +/- Difference Inc. R & D
"The Transition of Power"
Category Science, Energy, Research
Tags Energy, GLOBAL WARMING, clean tech
Email www.prlog.org/email-contact.html#11722293
Country Canada
Link http://prlog.org/11722293

7.6.2 Example 2


By Potential Difference Inc.
Dated: Sep 21, 2011

International Day of Peace 9/21/11 Video Presentation ~ Law of Conservation of Energy is False...
Revisions Required.

Potential Difference Inc. has established that energy CAN INDEED be created and that infinite supplies of inexhaustible and clean energy are available right now through PDI's Regenerative Acceleration Generator Technology which is being licensed freely to the world.

Basic Physics and the Law of Conservation of Energy state that:

"Energy cannot be created"

Energy is the capacity to do work. You must have the energy to do work whether that work is accelerating an electric motor in an electric vehicle or decelerating the same vehicle. Either way, in order to do any work energy is required and to generate energy some work must first be performed.

Potential Difference Inc.'s latest video demonstration uses the Work-Energy Principle to prove that the Law of Conservation of Energy is false. The implications of this new energy revelation on world peace and environmental protection cannot be underestimated.

Potential Difference Inc.'s YouTube Channel: http://www.youtube.com/user/ThaneCHeins

ENERGY CAN BE CREATED ~ Law of Conservation of Energy is False Video

http://www.youtube.com/watch?v=W_wleUlcMK0

The video demonstration shows clearly how the Regenerative Acceleration Generator has the capacity to accelerate itself without any extra external energy being supplied to it. Then the system is operated in conventional mode and it is demonstrated how much energy is required to perform the same feat.
IMPLICATIONS AND USES FOR INDUSTRY

Regenerative Acceleration Generator Technology can be employed as a Kinetic Energy Generating System [KEGS] to improve overall efficiency and can be applied immediately to any existing system that requires torque to provide motive power. This includes gas powered automobiles, trains, boats, airplanes, transport trucks and so on. The technology also applies to current electricity generating technologies such as wind and hydroelectric power where electrical output can be increased dramatically.

Than C. Heins  
President  
Potential +/- Difference Inc. R & D  
"The Transition of Power"  
"How do we make the world work for 100% of humanity in the shortest possible time—through spontaneous cooperation without ecological damage or disadvantage to anyone" ~ Dr. R. Buckminster Fuller

Background of Potential Difference Inc. PDI is a Clean-Tech/Energy R & D company which was founded by Thane Heins and incorporated in 2005. Initial PDI research began with Dr. Paul Allarie at the University of Virginia's Rotating Machines and Control's Laboratory [ROMAC]. PDI was invited to move its research into a satellite lab at the University of Ottawa in 2008 following a successful technology demonstration at MIT. PDI's technologies were further developed and refined under the supervision of Dr. Riadh Habash in Ottawa University's power lab.

PDI's area of focus shifted in 2007 with the development of Regenerative Acceleration Generator Technology [RM]. Regenerative Acceleration Generator Technology [RM] Regenerative Acceleration Generator Technology represents a major breakthrough in EV and HEV design which will now allow all EVs to continually recharge their batteries and may ultimately provide unlimited range and eliminating the need for plug in recharging.

Category Energy, Transportation  
Tags Thane Heins, Energy  
City/Town Ottawa  
State/Province Ontario, Country Canada  
Link http://prlog.org/11668383

7.6.3 Example 3

Why the Law of Conservation of Energy is FALSE and has NEVER Applied in an Electrical System

By Potential Difference Inc.  
Dated: Jul 26, 2011

How the Regenerative Acceleration Generator Technology VIOLATES the "Theory" of Conservation of Energy along with Newton's Third law, Lenz's Law and the Work Energy Principle as easy as 1, 2, 3.

The law of conservation of energy is a law of physics. It states that the total amount of energy in a system remains constant over time [is said to be conserved over time]. A consequence of this law is that, "energy can neither be created nor be destroyed" it can only be transformed from one state to another. This law does NOT apply, nor has it ever applied in electrical systems when current flows in a wire because two forms of energy are always present [one which is CREATED] and conventional science has only ever accounted for one [the non-created form of energy].

The two energies present; are the energy flowing inside the wire and the energy created and stored outside the wire in the electromagnetic field. The energy outside the wire in the electromagnetic field is CREATED by the current flowing inside the wire and the magnitudes of both are directly related.

The energy that is created and stored in the electromagnetic field is strong enough to stop a freight train or levitate a freight train as well an electric automobile. As it turns out it is also strong enough to accelerate the very same freight train and electric automobiles.

Michael Faraday builds two devices to produce what he called electromagnetic rotation: a continuous circular motion from the circular magnetic force created around a wire. Near the end of his career, Faraday proposed that electromagnetic forces that were created extended into the empty space around the conductor. This idea was rejected by his fellow scientists, and Faraday did not live to see this idea eventually accepted. Faraday's concept of lines of flux emanating from charged bodies and magnets provided a way to visualize electric and magnetic fields. That mental model was crucial to the successful development of electromechanical devices that dominated engineering and industry for the remainder of the 19th century.

HOW AND WHY THE REGENERATIVE ACCELERATION GENERATOR VIOLATES THE LAW OF CONSERVATION OF ENERGY

As you increase the operational frequency of ANY generator coil you also increase the AC impedance [AC resistance] of the coil which is calculated by: Zt = 2 pi F L where:

Zt is the Total AC Impedance  
F is the frequency of operation  
L is coil inductance

CONVENTIONAL GENERATOR COIL OPERATION  
[aka EV Regenerative Braking]

1) When the magnetic field is approaching a Conventional Generator Coil [which is connected to a load] - current flows in the coil.  
2) When current flows in the coil, a Counter-Electromotive Magnetic Field is induced in the coil which repels the approaching magnet [aka Lenz's Law and the Law of Conservation of Energy].  
3) The coil operates as an inductor and stores energy in the external electromagnetic field.  
4) The greater the load current the stronger the COUNTER-electromotive-magnetic-field produced and
MORE the energy required to keep turning the generator under load.

1. REGENERATIVE ACCELERATION GENERATOR COIL OPERATION [aka EV Regenerative Acceleration]

1) When a magnetic field is approaching a Regenerative Acceleration generator coil - current CANNOT flow in the coil because the AC impedance does not allow it.

2) Current cannot flow as long as the magnetic field is approaching [moving].

3) If current cannot flow the coil cannot produce a counter-electromotive magnetic field to satisfy Lenz's Law or Newton's Third Law or the Law of Conservation of Energy.

4) As the magnetic field approaches the coil the induced voltage in the coil keeps increasing until it reaches TDC where it is at a maximum.

5) The coil is OPERATING AS AN CAPACITOR storing energy as voltage internally in the ELECTROSTATIC FIELD in between the wires.

6) At TDC = Top Dead Centre the magnetic field is neither approaching NOR receding the coil and the induced voltage is now maximum.

7) At TDC the frequency dependent AC impedance drops to the DC resistance of the coil which is now low enough to allow current to flow.

8) The high induced voltage in the coil is dissipated through the low DC resistance of the coil and a MAXIMUM DELAYED magnetic field is produced.

9) This [maximum magnitude] DELAYED magnetic field pushes away on the now already receding magnetic field [as it moves past TDC] and attracts the next opposite pole one the rotor as it moves into position.

10) The greater the load current the greater the COMPLIMENTARY-electromotive-magnetic-field produced and LESS energy is required to keep turning the generator under load.

11) At TDC current is allowed to flow and an AC current pulse is delivered to the load [recharging the EV batteries] whiles the rotor armature and EV are both accelerated.

Further explanation can be found in the "Basic Physics Document" and the "Article Ontario Centre Journal of Public Policy" as found on our LinkedIn profile page.

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Category Research, Energy, Automotive
Tags Thane Heins, generator, EV
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Link http://prlog.org/11600274
Endnotes