

## Utilizing Gravity Assisted Power

### What is Gravity Assisted Power?

For thousands of years, mankind has been using the force of gravity to assist with work. In areas with waterfalls, our ancestors built **waterwheels to capture the moving water's energy to drive gristmills or to power machine shops.**



As new technologies were developed, electric generation plants were built using much larger waterfalls. **The hydroelectric plants at Niagara Falls are a good example of this today.**

**Gravitational Energy Corporation (GEC)**, located in Northeast Ohio, **is on the cutting edge of developing a new technology** based on this old concept of Gravity Assisted Power. **But rather than using falling water, GEC uses a pendulum.**

Capturing the **energy from the momentum created from the gravitational force affecting a falling object** as a

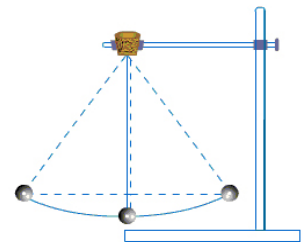


mechanical advantage **is the principal concept behind the Feltenberger Pendulum**; invented by the president and CEO of GEC, Bruce Feltenberger.

**The Feltenberger Pendulum has one US patent issued**, a second US patent is pending and a Patent Cooperation Treaty (PCT) application is being prepared.

**A pendulum is a weight suspended from a pivot so that it can swing freely.** Pendulums are used to regulate pendulum clocks and are used in scientific instruments such as accelerometers and seismometers. Historically they were used as gravimeters to measure the acceleration of gravity in geophysical surveys, and even as a standard of length.

When a pendulum is displaced from its resting equilibrium position, it is subject to a restoring force due to gravity that will accelerate it back toward the equilibrium position. When released, the restoring force combined with the pendulum's mass causes it to oscillate about the equilibrium position, swinging back and forth. The time for one complete cycle, a left swing and a right swing, is called the period. A pendulum swings with a specific period which depends (mainly) on its length.





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The simple gravity pendulum is an idealized mathematical model of a pendulum. This is a weight (or bob) on the end of a massless cord suspended from a pivot, without friction. When given an initial push, it will swing back and forth at a constant amplitude. Since pendulums are subject to friction and air drag, the amplitude of their swings declines.

### Operating the Feltenberger Pendulum



**is as easy as pushing a child on a swing** (another example of a pendulum). It takes a little effort to get it moving, but once in motion,

**it takes far less effort to keep it swinging.**

The **first advantage** of the Feltenberger Pendulum design **resides in its pivot.** By **reducing the friction at the pivot point** of the pendulum **to nearly zero,** the **Feltenberger Pendulum swings very freely and only needs an occasional small input force to maintain its motion.**

The **second advantage** of the Feltenberger Pendulum is how it captures the momentum from the swinging pendulum. **As the pendulum swings, the axle reciprocates in a linear (straight line) manner, causing a pumping action.** We call this **a double-reciprocating pendulum.** As the pendulum **swings back and forth, it also slides in and**

**out providing an increased momentum.** It's this linear or in-and-out motion that **we harness as the mechanical advantage to assist with work.**

The axle of the pendulum is attached to a piston rod that pushes and pulls the piston in a pump. The size of the pendulum and the type of pump used are dependent upon the type of "work" you want the pendulum to do.

**Our first production model, the GP210** is a General Purpose piston pump that **is used to pump water for irrigation or through a filtration system to produce safe drinking water.**



GEC donated a GP210 to help the earthquake victims in Haiti where it easily produced daily drinking water for around 4,000 people with only three hours of operation a day.



The pendulum on **the GP210** weighs just 40 lbs. and is 48 inches long. It **is a hand-powered machine that allows its operators to pump up to 1,000 gallons of water per hour.**

A selector pin on the axle alters the length of the linear stroke to change the flow rate/pressure of the water being



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pumped. This **allows the operator to pump pressurized water, up to 60psi,** through a reverse osmosis system **with nearly the same effort required to maintain the swinging pendulum with no water pressure.** There is NO other HAND-OPERATED pump in existence today that can pump water at these volumes or pressure.

**On a much larger scale,** GEC has produced a prototype machine capable of producing commercial grade electricity.



Our **18,000-pound pendulum** is operated mechanically with a compressed air system providing the input energy. This system is computer-controlled, and in testing this machine, the benefit from Gravity Assisted Power **enabled us to realize a two-thirds reduction in the pressurized air supply needed to maintain operation of the pendulum.**

**We are confident that we can** replace the air system with a fuel-based system using natural gas, propane, gasoline, kerosene, diesel or bio-diesel to **produce electricity while using only about one-half the fuel per kilowatt-hour that other systems require.**

Currently, internal combustion engines that are used to drive generators are only in the range of 20 to 40 percent efficient when comparing the energy value of the fuel being used to kilowatt hours produced. There is certainly room for improvement, and we believe **the Feltenberger Pendulum Gravity Assisted Power process can produce dramatic results.** We may be able to **double or triple the amount of electricity produced by a given unit of fuel.**

When successful in this pursuit, we will then turn our attention to steam-driven generating systems to see how we can do the same thing with coal. Currently, the heat value of coal is converted to electricity at the rate of about 30 to 35 percent efficiency. Once again there is a lot of room for improvement.

**Gravity Assisted Power (GAP)** is not a new concept, but the GAP-based application of the Feltenberger Pendulum technology is a new way of harnessing this **free and truly sustainable energy source.** Gravitational Energy Corporation is leading the way in creating the most efficient energy machines in the world, **making Northeast Ohio "The Center of Gravity".**

**Gravitational Energy Corporation, Inc.**

**1474 Main St., Cuyahoga Falls, OH 44221 \* Mail to: P.O. Box 26242, Akron, OH 44319  
330-920-6222 \* GEC@gravityassistedpower.com  
www.gravityassistedpower.com**