



SENIOR DESIGN ORGANIZATION SYNOPSIS – SPRING 2013

Solar Powered Steam Engine

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Demand for alternative fuels and new sources of energy keep growing every year worldwide. Team Steam plans to build a solar powered steam engine in order to satisfy small power requirements for activities such as camping, tailgating, or boating needs. This will be accomplished by creating a closed system that will operate solely on solar power, and utilize steam as a medium to convert solar energy into mechanical energy.

The process will begin by taking a parabolic solar reflector and harvesting solar power in order to heat up a glass container placed at its vertex, the heat collected will be used for steam generation for the system. When optimal steam pressure has been reached, a valve will allow the steam to flow into the engine. The change in pressure will create a linear displacement on the cylinders that will be transformed into rotational mechanical energy by the use of a flexible rod as a drive shaft. The exhaust steam will then flow into an air-cooled condenser, which will convert the steam from its gaseous form to its liquid state. After the steam is changed back into water, it will flow into a pump that will feed it back into the heating container. This thermodynamic cycle is known as the ranking cycle and it is responsible for 90% of the electricity created in the world.

The steam engine responsible for generating power will be built by using the plans acquired from Green Steam Machine™. Since the project will focus only on concept and efficiency, the smaller two-cylinder engine will be used. This engine is particularly efficient for multiple reasons: it runs on very low steam pressure and low volume, and it can freewheel at only 2 psi of steam pressure. The cost to build the engine is also considerably low, since most of the parts can be either purchased online or made. There are almost zero lubrication requirements, which reduce the cost of maintenance once it is built. Another key factor is the fact that the engine is composed of few moving parts, therefore reducing the chances of something going wrong and the engine failing. The steam engine can also run in any position the same way an electric motor can, adding versatility to any application it may be used in, where direction matters.

The benefits associated with this project include finding alternative ways to generate energy whether it is mechanical or electrical, finding ways to reduce pollution due to not having to resort to burning fossil fuels and making this type of technology available to anyone interested in pursuing a form of clean renewable energy. As this type of clean energy harvesting evolves and becomes more efficient and its cost reduces, more people will take advantage of its incredible potential.