2008 Notre Dame Ideas Challenge

Hybrid Electric Motorcycle

Eric Schafer
Jean Whitney
Ravi Fernando
Steve Govea
Jeffrey F. Wolanin

# Idea:

With the growing dependence on fossil fuels, the group intends to create a functional series hybrid motorcycle as a step in moving towards an alternative source of locomotion. As the project currently stands, the group is fortunate enough to inherit a functional electrically powered motorcycle due to the hard work of a group of electrical engineering senior design students last year. Their design will be vastly improved upon in multiple areas including, but not limited to, the following:

* Interfacing the generator to charge the battery system, thus creating a series hybrid cycle
* Improving the charging circuitry, allowing for a faster, safer, and more efficient charge
* Enhancing the DC-to-DC converter circuitry to more efficiently power the electronics on the device
* Implementing an advanced data collection, storage, and analysis system to provide feedback on the motorcycle’s state and make changes based on this information
* Creating a interactive user interface to display important information regarding the state of the motorcycle

# Problem and Solution:

In a broad sense, the project aims to demonstrate the feasibility and efficacy of developing a series hybrid system, which would in turn help reduce the dependence on fossil fuels and by virtue, greenhouse emissions. Moreover, if five students, without a college degree, could create a functional series hybrid motorcycle, experts tackling the subject should be able to achieve even far greater success.

# Necessity of Idea:

As society progresses closer and closer to peak fuel, the importance of finding an alternative source of energy to maintain the current standard of living and mobility for millions of people (and improve it for billions of others) will become immensely important. As alternative technologies do not exist in an advanced enough state to move exclusively away from fossil fuels at this time, society will have to utilize a transitional technology until a sustainable alternative is found. Parallel hybrid technologies have demonstrated staying power in the international market, and the group believes that hybrid technology will be at least one of the critical transitional technologies. It is in this light that the group has chosen to pursue this given project.

# Similar Ideas:

Quite obviously, hybrid technologies have been in the international market for quite some time now. One of the major differences in the group’s design is the series configuration as opposed to the parallel one most commonly used in the automotive industry. This method leads to increased efficiency since the mechanical link between the engine and wheels has been removed. Additional efficiency results from the fact that the engine can run at a constant, efficient rate over a wide variety of speeds. To this point, two of the major limiting factors of this design have been the ability to store enough energy in the batteries to allow for comparable fuel ranges as well as a long charging cycle. The group hopes to move towards solving these critical issues based on the design of an advanced charging circuitry, intelligent programming, and an efficient design. Although this idea is certainly not the most novel one, it certainly has the promise of contributing to the advancement of a very important transitional technology.

Lastly, the group must also give credit to last year’s senior design group. They originally proposed this idea, and this year’s group is merely completing and enhancing last year’s design.

Not included due to space constraints:

In a parallel design, the internal combustion engine and electrical motor are combined into one unit to power the various systems of the vehicle. On the other hand, in a series design, the combustion generator produces electricity to power an electric motor and charges the electrical storage unit, or batteries.