



Senior Design Project in Electrical & Computer Engineering



USES Unit Analysis

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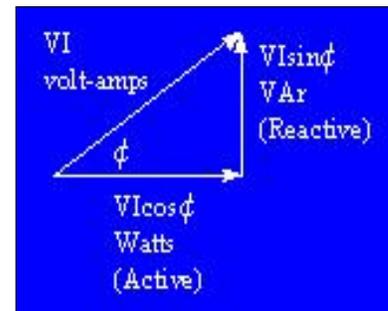
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Examples of USES units

Project Background

The Universal Shunt Efficiency System (USES) Unit Analysis Project was instigated by the mystery and controversy that surrounds this piece of equipment. Pure Power Systems Inc., the manufacturer of USES, claims that their device is able to decrease the Reactive power allowing machinery to run more efficiently and saving the customer money. However, no one is positive what happens to the power between the time it enters the USES and the time it leaves the device.



An Illustration of the power triangle; Instead of adding negative Reactive power, a USES unit shrinks the existing Reactive power.

Project Plan

The plan is to perform several tests that would determine the validity of the manufacturer's claims. The design of these tests is the heart of the project. A large variety of tests by many different groups and companies have already been performed yielding a range of results. The tests developed in the USES Unit Analysis Project will deliver a clear, unbiased, and accurate conclusion of exactly what the capabilities of this device are. We will create two tests looking at Unbalanced Voltage Regulation and at Harmonic Distortion.



Machinery breaks down all the time and a technician like the one pictured needs to come to fix it. We will investigate to see if the USES is able to improve reliability by reducing power, heat, and harmonics.

Project Work

Because USES units have been installed in commercial use for some time, substantial work has already been done in analyzing the USES system. Connecticut College has had one of these devices installed in its gymnasium since 2001. Working with the Connecticut College facility engineers we obtain the historical data of its performance to analyze the energy and money was saved because of it. While we have access to these operational USES units, we still require controlled laboratory experiments to perform tests to determine what effect it has on power and why it saves energy, if it actually does. In the laboratory we can determine if a USES unit is able to correct unbalanced voltage, what it does to harmonics, and how it protects against surges in power. These three items are possible ways that the USES is able to improve power quality, and finding answers to them will clarify the potential of USES units.

Project Deliverables

We need to know whether the USES unit is able to save energy allowing customers to spend less money on electric bills and maintenance costs. The finished project will be an explanation of the extent that this device is able to affect reactive power. This will have applications to both ashore facilities and afloat assets that use large amounts of power and could potentially benefit from emplacing one off these units. Reducing the power requirements could save the Coast Guard a tremendous amount of money and increase the reliability and performance of capital assets.

Coast Guard Cutters could stay deployed longer and increase their operational capacity if we improved the quality of power.

