A White Paper by:
The Technology Consortium, Ltd.

Piedmont, SC 29673

864-277-1645

http://TheTechnologyConsortium.com/

Saving Energy with Process Control Technology Substantially Reduces Motor Operation Costs

By: Ron Hoffman, president
The Technology Consortium, Ltd.

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Contents

Abstract:

Commercial and industrial electrical power is a constantly rising cost that must be controlled. Reducing this expenditure not only makes sense from an operational and profit standpoint, but also from the aspect of increased government regulation.

Identifying the Problem:

When controlling the rising cost of power became a necessity, we searched for a viable solution. While new methods of power generation may be a long term solution, the immediate resolution was to decrease existing power consumption.

In order to reduce energy consumption by any significant amount, we first had to establish where and how this energy was being consumed. The US Department of Energy Studies determined that most of the power consumed (60-70%) was due to industrial and commercial (3-phase) motors. These motors are wasteful energy consumers since they run at full speed and often at half load.

Limitations of Existing Technology:

Existing Industrial/Commercial motor controls methods were evaluated as a means to manage and decrease consumption. Historically, motor operation and efficiency has been improved by regulating motors with Variable Frequency Drives (VFD's). This energy saving is due to the *"Affinity Law"* of motor power. This results in a large reduction of energy for even a small reduction in speed. The motor will typically consume only 25% as much power at 63% speed than it will at 100% speed.

The weak link to this VFD technology was the various control technologies (PID/PLC) used to regulate the speed of VFDs. Additional evaluations identified that these control systems were restricting VFD efficiency and needed to be improved.

Traditional Motor Control:

VFD motor control has been the accepted way to reduce energy consumption for over twenty years. However, due to the complexity and constraints of the PID/PLC programming, most facility equipment (Air-handlers, Chillers, Compressors, HVAC Systems, Pumps, etc.) were never considered as suitable applications and were therefore neglected. With rising energy costs, many energy conscience facility owners are now re-evaluating these applications and incorporating VFD motor control systems.

Unfortunately, VFDs were still severely hampered and restricted by the (Lack of) precision in the PID/PLC controls packages available. These control philosophies rely on set parameters that need to be manually programmed into a software operational code. This programming was not only an additional cost, but it needed to be modified and adjusted to meet process changes. This re-programming cost added to the expense. The programming also limits and reduces the flexibility, efficiency, and energy savings that VFDs are capable of producing. Manually programmed operational code incorporates defined set-points, limitations, and parameters that lack responsiveness, and often conflict with optimum motor operation. Due to these control limitations, PID/PLC controlled VFDs are only capable of reducing energy consumption by 10-20%!

Fortunately, new emerging technologies were about to eliminate these (Program) deficiencies and substantially increase the energy saving capabilities of VFDs.

The Innovative Solution:

Following years of intensive R&D effort and product development, the answer was found in the creation of a *Smart Microprocessor/Algorithm*. This *Smart Microprocessor* replaces the obsolete PID/PLC controls system previously used to manage the VFD. The *Smart Microprocessor* eliminates the predefined, inflexible, and costly programming required with typical PID/PLC controls and replaces it with an elaborate Algorithm (Mathematic Formula). This Algorithm utilizes Fuzzy-logic and Stepless-controls to manage and direct motor operation in the most efficient manner. The new *Smart Microprocessor* control technology manages the VFD and optimizes how much electricity motors consume. This is based on instant and seamless response to process demands.

This new *Smart Microprocessor* technology is now available domestically as the *HELP (High Efficiency Local Processor) System*. The *Smart Microprocessor* controlled *HELP System* also utilizes phase balancing, and harmonic shielding to protect non-VFD rated motors from damage. Additional bypass circuitry protects your process and keeps it operating in case there is a problem with the VFD system. An additional bypass function protects your equipment from an abnormal input power signal (Single-phasing). As a result, your process and equipment is protected and available free from interruption. The *HELP System* also has many unique and additional benefits:

Benefit 1:

This *Smart Microprocessor controlled HELP System* technology is an immediate retrofit solution that utilizes accepted and proven VFD technology.

Benefit 2:

This *Smart Microprocessor* technology dramatically reduces energy consumption, and lowers your cost, while improving the performance of your existing motors.

Benefit 3:

This *Smart Microprocessor* Algorithm substantially increases and optimizes VFD efficiency which lowers energy consumption and increases savings.

Benefit 4:

This *Smart Microprocessor controlled HELP System* technology is a "Turn-key" solution that is ready to install and run.

Benefit 5:

This *Smart Microprocessor controlled HELP System* technology is an augmentation to existing equipment and does not require any additional changes or modifications.

Benefit 6:

This *Smart Microprocessor controlled HELP System* technology has been proven to enhance process accuracy and efficiency while decreasing equipment wear and maintenance.

Benefit 7:

This *Smart Microprocessor controlled HELP System* technology reduces the amount of new power generation capacity that needs to be produced through new "Green" power-generation projects.

Testing, Verification, and Incentives:

The world renowned and accredited *SGS Group* has certified actual reduction of over 48% of amperage and 52% of kW consumption in actual installation testing! The VFD technology used in the *HELP System* also qualifies for the *Duke Energy Smart $aver®* Incentive Program as a viable energy saving device. This approval allows customers to reduce the initial cost of the equipment by utilizing substantial incentives. As an approved energy reduction device, this technology also qualifies for LEED credits and other incentives.

Performance Results and Additional Benefits:

By eliminating the pre-programmed VFD limitations, the *Smart Microprocessor* reduces over 30-40% of the actual kilowatt energy consumed by motors. This reduction is a direct energy savings and lowers energy (kWh) costs by a similar (30-40%) percentage.

This *Smart Microprocessor* controlled VFD technology was only released to the Commercial and Industrial market in 2008. In four short years it has proven to substantially reduce energy consumption in thousands of worldwide installations.

International clients are already reaping the benefits of this "Next-generation" energy saving VFD technology. Actual customer reports and references are available for review.

The *HELP System* is a self-contained "Turn-key" motor control system that easily interfaces with existing equipment. Typical installations are completed in less than two hours and equipment interruption is usually less than fifteen minutes.

Technology Availability:

The Technology Consortium, Ltd. has had an exclusive agreement to introduce this proven VFD control technology to the North American market since 2009. Many large domestic companies are already in the process of evaluating and installing this new *HELP System* technology. Due to demand, we are in the process of setting-up a domestic source of manufacturing.

Applications:

Ideal *HELP System* applications include Air-handlers (VAV), Chillers, HVAC Compressors, Air Compressors, Pumps, as well as any 3-phase motor that is currently running across the line, and does not require full-time/full-speed operation.

We also offer a *HELP System* to optimize and update existing VFD controlled motors. Known as the *HELP-R (Retrofit) System,* this system updates your existing VFD controlled motor with the latest *Smart Microprocessor/Algorithm* technology.

Conclusion and Additional Information:

The *HELP System* will dramatically reduce your electrical motor energy costs. Please visit our website for additional information on the benefits of this new *HELP System Smart Microprocessor* technology…

Learn more about the HELP Energy Saving System, and contact us at:

http://www.TheTechnologyConsortium.com