NK Technologies
NK Technologies • 3511 Charter Park Drive • San Jose, CA 95136
800.959.4014 • www.nktechnologies.com • sales@nktechnologies.com

Monitoring Power vs. Current

As a manufacturer of both power and current monitoring products, we are often asked to explain why an application should use one product over another. The answer cannot be simple, but we will attempt to explain why we make both products. One company who also manufactures power transducers spends a lot of advertising dollars promoting their power transducers, and it reminds one of an old colloquialism: "If your only tool is a hammer, every problem looks like a nail". In the case of this manufacturer, they don't sell any products other than power transducers.

This isn't a bad thing, but adding power monitoring to all circuits can be very cost prohibitive. There are many applications where power monitoring is the best way to check the health of a system.

Power Monitoring Advantages

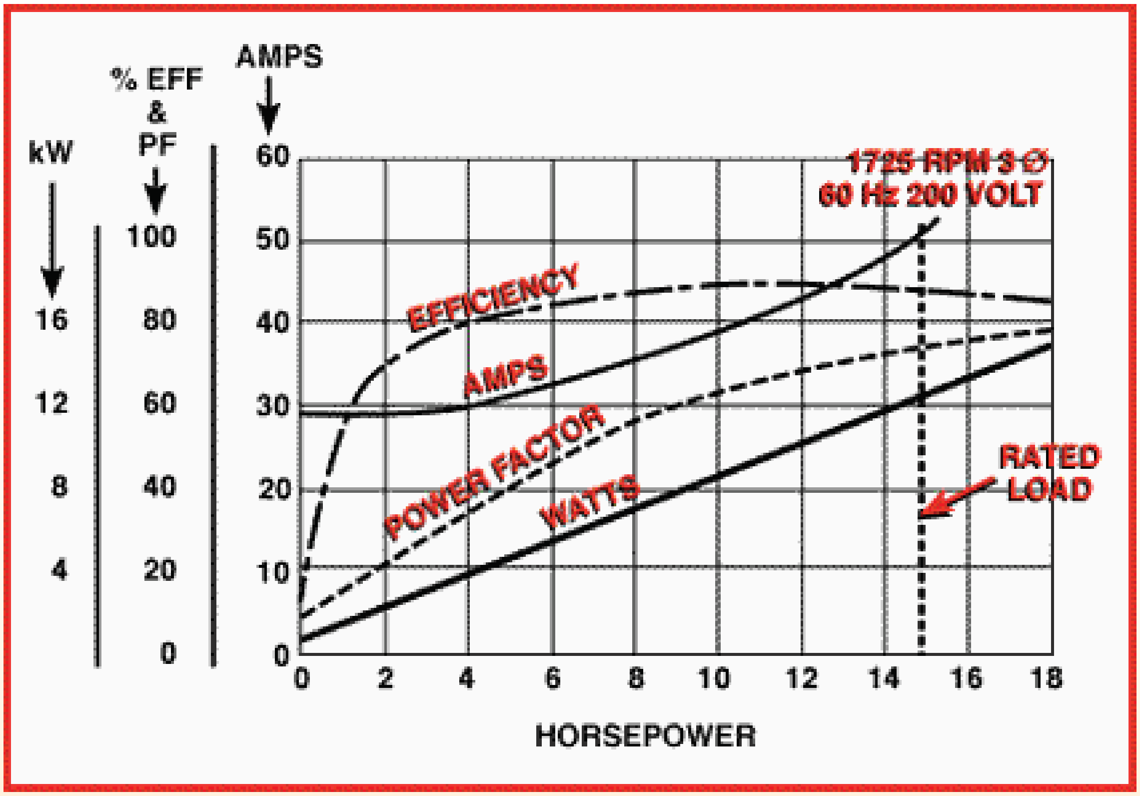
By definition, a power monitoring system compares the voltage and the current at the same time. By the use of various methods, a signal can be obtained that shows the actual wattage being used at a given time. Using newly developed microprocessor designs increases the sampling rate, and can help with the mitigation of harmonic content. Since the voltage and current are being sampled, separate signals can be obtained from the system, including line to line voltage, line to neutral voltage, current per phase, power factor, apparent power, harmonic content and watt hours, when the signal is compared over a time interval.

Power increases linearly as the load increases, regardless of the power factor. Power factor is the ratio of the real power to the apparent power. In a purely resistive load, such as heating elements, there is no reactive component, neither capacitive nor inductive. In these cases, the power factor is 1.00, often called "unity". The wattage is the product of the current and the voltage. In most other applications, there is either some induction, causing the current peak to lag the voltage peak in an alternating current load. This creates the need for more current to produce the same amount of work, which can cause over heating of the conductor unless the design can accommodate the current.

The main selling point of the power monitor over a current monitor is power factor in an inductive load, specifically motor loads. Since 60-70% of the power used in the US drives electric motors, this can be a big issue. While most motor manufacturers publish their product power factor at full load only, and seldom report the open shaft data, it is very difficult to find out during the design process how a motor will respond if it is oversized for the load, or will often be rotating with a minimal load. While over sizing a drive motor seems like a good idea, especially if the load may increase in the future, an economic analysis may prove this to be untrue. Consequently, the majority of drive motors are selected be have a capacity to handle the load presented during design, but not with a lot of extra horsepower available.

The end result is the motor is seldom energized and running with a minimal load. There are times when this does occur, such as some mixing operations, some conveyors, and escalators.

NK Technologies
NK Technologies • 3511 Charter Park Drive • San Jose, CA 95136
800.959.4014 • www.nktechnologies.com • sales@nktechnologies.com



This is a chart showing the changes in performance of a 15 horsepower, 208 VAC, 1800 RPM base speed squirrel cage motor. As you can see the current changes little between no load to about four horsepower. After that, the current increases almost linearly as the load increases.

Power Monitoring