

Real-time Markets – Is Your Laboratory Prepared?

As the use of electricity skyrockets, what can laboratories do to insure that consistent and quality power delivery is available for sensitive instrumentation?

Real-time markets are a part of our everyday lives. Whether it's the crude oil market, of which we are all feeling the effects because of its climb to \$75 a barrel, or the American Stock Exchange, which requires diversification and knowledge to yield success, we can either be proactive or reactive when caveat emptor is the phrase of the day.

In reaction to the increased price of gasoline, some individuals are re-evaluating the utility of high fuel consumption SUVs and opting for hybrid vehicles or carpooling to save energy costs. Some proactively respond to the dynamics of this real-time market phenomenon, make adjustments, and find better ways to maximize their lives, while others will be caught unaware, only to suffer the consequences. Times are changing and so must we.

The American Stock Exchange (NYSE, NASDAQ, and/or OTC) is another example of a real-time market that can have a profound effect on our daily lives. Though investor goals vary widely from short-term trading to long-term growth, all investors are subject to the rise and fall of the market. Some choose to be proactive in their knowledge of market trends, etc., while others are more reactive, and thus, at heightened risk. If you are successfully diversified and hedged, the market yields rewards, but only if you diligently watch the trends and are not caught unprepared by recession.

IN THE LABORATORY

An important real-time market that affects our daily livelihood in the laboratory is electrical power. As long as the lights are on and we are not threatened by rolling blackouts, as California experienced in June 2001 and the Northeast during the week of August 11, 2003, we take the availability and quality of electrical power for granted. If any resource is the subject of a real-time analysis, it is the electrical power market, because we do not have an economical way of storing electricity for peak demand use. While we can convert energy from fossil fuel (coal, oil, or gas), thermo-mechanical (steam/hot gases), petrochemical, hydro-electric, nuclear, or wind energy into electrical energy, the only way to store electricity is via storage batteries (direct current), a rotating apparatus such as a fly wheel (mechanical), capacitors (charge storage), or inductors/electro-magnetics (coils). All of these methods are short-term power bridges.

The electric power industry is a classic oligopoly that is highly regulated by local, state, and federal government agencies. There are no less than six regulatory agencies that govern power generation, distribution, and initial power quality. Power generation is regulated for an average 7% reserve capacity. That number can easily be exceeded due to weather and environmental factors, as well as local events, such as the Northeast Power Grid failure—an event that started in Michigan and progressed throughout the Northeastern states, including NY and Canada. The generation and transmission of electrical power is a closed-loop system that is based upon 18th century technology and 20th century controls. Energy is sourced (generated) and must



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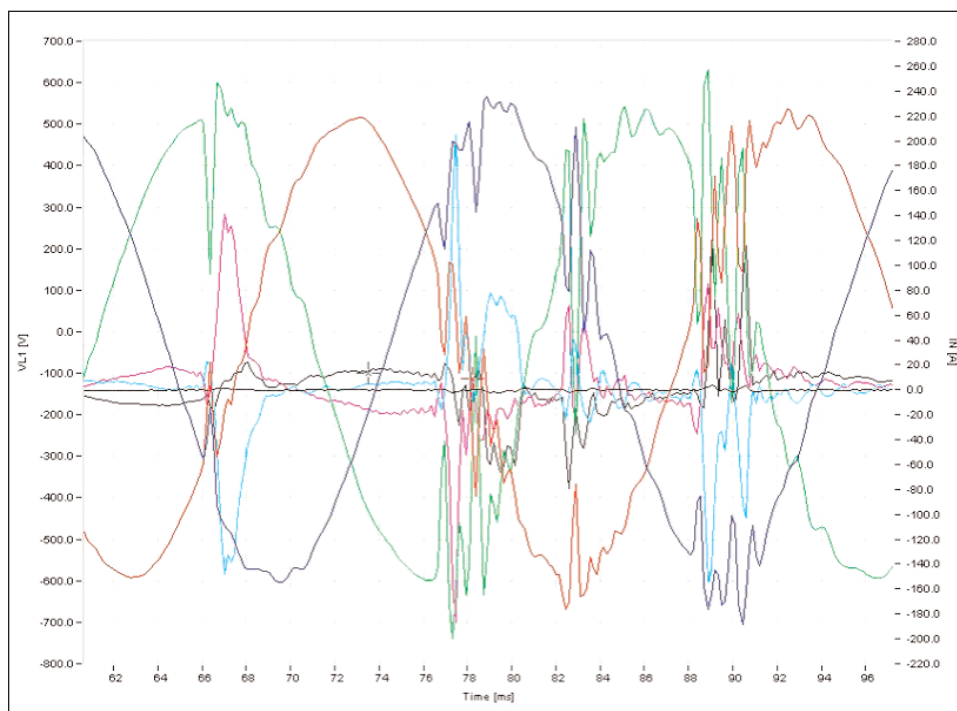


Figure 1 illustrates typical electrical power when closely examined in small millisecond (ms) intervals. It is quite obvious that the electrical power is not the smooth, traditional sinusoidal wave. While this quality is acceptable to power lighting, it is totally hazardous to the life of the sensitive electronic circuits found in both analytical instrumentation and informatics.

return via a sink (ground) in a closed-loop system. All users of electricity are common “party line” users. Whoever consumes electrical power and modifies its wave form (quality) via their use processes affects us all. When initially generated, the quality of electrical power is exceedingly high and tightly regulated. The problem with power quality is that it is a pooled, contaminated resource by all other users. Power quality must be corrected locally.

Figure 1 illustrates typical electrical power when closely examined in small millisecond (ms) intervals. It is quite obvious that the electrical power is not the smooth, traditional sinusoidal wave we are all used to seeing in textbooks. The power in this example has been adulterated by digital signals, switching power supplies, collapsing electro-magnetic fields, storm- and switching-induced transients, variable frequency drives, power factors, harmonics, surges, voids, low lines, and spikes. While this quality is acceptable to power lighting, it is totally hazardous to the life of the sensitive electronic circuits found in both analytical instrumentation and informatics.

Dr. Kevin Rosenblatt, Assistant Professor of Pathology, Associate Director of the Translational Pathology Division, and Director of the Clinical Proteomics Program at the University of Texas Southwestern Medical Center, learned first-hand the challenges and true costs of unconditioned electrical power. The power-related problems at the medical center were causing his key instrumentation to be inoperable 50% of the time. Dr. Rosenblatt, in conjunction with the instrumentation manufacturer, PerkinElmer-Sciex, determined

that one of the root causes of the laboratory’s instrumentation performance problems was inconsistent power delivery, including power fluctuations, harmonics, and transients. At the request of PerkinElmer, we worked diligently to solve the laboratory’s inconsistent power delivery problems, and since installation of a certified category III-3 instrumentation laboratory protection system (LPS) device, the medical center has not experienced a single power outage or blip, resulting in an annual cost savings upwards of \$500,000 for a single MALDI-TOF mass spectrometer.

While skeptical at first, Dr. Rosenblatt quickly learned the effects of real-time markets, how to manage and hedge his investments with certified category III-3 LPS solutions, and the steps to take to maximize the performance of his highly automated laboratory and its associated research instruments. He responded to the dynamics of this real-time market phenomenon, made proactive adjustments, and found ways to operate his laboratory efficiently. The question for the laboratory manager is whether the laboratory is prepared or will it be caught unaware by the hazards of the real-time electrical power market and suffer the consequences—*caveat emptor*.

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Image Source: General Electric