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[Editor’s Note: In the last issue of The Locomotive, the author focused on telecommunications. In this article, he takes a look at the impact of telecom and other equipment within the e-business industry.]

Electronic commerce, or e-business, locations present unique exposures when compared to those of so-called brick and mortar business locations of similar size. An e-business risk exists at any commercial business location that produces revenue based on transactions made through a public or private information network. The individual transactions may be large or small. The transactions involved in e-business can include retail sales, currency and securities trades, credit card charges, or information services. In most commercial contexts, an e-business involves an Internet Web site.

What is a Web Site?
A web site is a virtual storefront. It is similar to a telephone call center with automation. A key difference is that it can operate around the clock, seven days a week. Another is that it can serve a worldwide market.

A web site can be active or passive. In the passive mode, it serves merely as a point for distribution of information. The information can be as minimal as an online business card, or as elaborate as an electronic copy of the sales catalog. The key is that in a passive web site, no transactions can be performed on line.

An active web site offers a two-way exchange of information, usually comprising a sales transaction. An Internet customer can search through the catalog of the e-business and, by a simple mouse click, design-ate products to be purchased. Once the customer has selected all the items, he or she can check out by providing credit card information and shipping instructions. Development of Internet commerce in recent years has strongly favored the active Web site.

The Equipment Pyramid
The pyramid in Figure 1 below shows that the basic building block of an e-business is the building that provides structure and shelter to the location. On that foundation are successive building blocks in descending order of necessity. Electric power is required by all of the elements laid upon it — cooling equipment, telecommunications gear, and computers. All must be present and properly interconnected for the location to operate. Each functional block depends on all of those below it in this figure.
Distinguishing Characteristics — Equipment

The development of the e-business model presents a few differences from an equipment standpoint. These arise from two aspects of e-business:

1. Most e-business technology assets are a collection of solid-state electronic equipment items of relatively modest individual component cost. Whether this is telecommunication gear or an Internet server farm, it can be economically repaired or replaced on an individual item basis. Even telephone switches having high acquisition cost are built in a highly modular way and can be readily repaired after individual component or module failure. Only an event that damages or disables a significant number of these individual equipment items will generate a really large financial loss.

2. Two kinds of events can produce widespread damage or disablement: (a) loss of power or (b) loss of cooling.

   In the loss of power case, business interruption will be the principal loss component, since the hardware should remain intact during the power interruption and be ready for return to service on its restoration.

   Loss of cooling, on the other hand, can produce widespread failures of electronic components resulting from high internal equipment temperatures, leading to costly property damage and ensuing business interruption, which will continue for as long as it takes to restore pre-loss operation.

Preventing Heat Damage

Heat kills. A rule of thumb: for every 10 degrees Celsius rise in temperature, the speed of chemical reactions doubles, including the chemical degradation of insulation materials and solid-state transistor junctions. From a technical standpoint, much of this heat-induced damage can be avoided if the facility is designed with interlocks that will perform an orderly shutdown of hardware when there is an increasing temperature. Such interlocking should be mandatory for insured locations.

Interlocking should include provisions that monitor temperatures in electronic spaces or racks. When rising temperatures are encountered, hardware should be shut down as necessary as the temperature limit is breached. If available, standby or emergency cooling resources should be brought on line.

The overriding objective is to prevent extensive, heat-caused damage to electronics so that resumption of normal operations can be accomplished after cooling issues are resolved without the added burden of replacing electronic equipment.

Property and Business Interruption Risks

Property-casualty loss events that involve an e-business site can be exceptionally severe. Such losses are likely to involve destruction of a large number of equipment items. Even though individual values may be modest, the quantity of these that can be installed in a given space can represent an exceptional content value. This is especially true if an ultra high reliability power and cooling installation is included in the loss.

Whether invoked under an equipment breakdown or property-casualty form, business interruption can be particularly dangerous in the e-business world if the location handles a high volume of transactional business. Large Internet retail sales and bank credit card processing operations are examples. What is the dollar value of 20 minutes of transactions for a major credit card? It is technically possible for such operations to be capable of a
transaction volume which is at least an order of magnitude greater than that delivered by a state-of-the-art, telephone sales operation of equivalent physical size.

Internet sales operations are becoming more numerous. It is a class of e-business risk that is growing rapidly. Such businesses do not, as a rule, always employ the kind of rugged power and cooling infrastructure that has been developed over time in the telephone industry. It is these newer enterprises that may not be backed by a sufficiently reliable power and cooling systems, and hence represent a greater equipment breakdown risk.

Computers and Telecommunications

Computers that provide functionality to an e-business can serve as file servers, telecommunications switches, or other network elements. Market forces (competitors) generally require that these be at state-of-the-art level of speed and function. Internet customers are intolerant of the delay and inconvenience imposed by obsolescent equipment and systems. For this reason, these objects tend to be reasonably new and, if the enterprise is financially healthy, constantly supplemented by late model gear.

E-business is defined by automated transactions. It is equipment, rather than the numbers of sales employees, that limits the business transaction capacity of an e-business center. The equipment list is selected and installed in anticipation of the busiest possible day of the busiest possible season. If that is not enough business interruption risk, a significant rate of near-term growth is allowed as well.

Electric Power and Cooling Infrastructure

When Internet commerce achieves a certain level of importance to a business, it becomes a “mission critical” function. This will occur when even a short duration loss of the revenue stream produced by Internet transactions becomes intolerable. Mission critical status is inconsistent with reliance on an increasingly unreliable electric utility system. Have you noticed that the load on utility power grids has become routine news whenever temperatures soar and demand peaks? The alternative to total reliance on utility power is the development of on-site power generation in one form or another.

Site power generation can range from a simple standby generator with battery-backed power supplies to a full-scale Random Array of Independent Devices (RAID) type, ultra-high reliability primary power system. When considering the importance of electric power, it is important that cooling be a part of the process. Almost every kilowatt consumed by electronics is released as heat, and that heat must be removed from the electronic devices. The reliability of cooling apparatus must be every bit as reliable as the electric power source.

Figure 2

Whatever the type of alternative electric supply, there are additional costs to consider and there are significant new equipment breakdown risks to be confronted. The exposure will be composed of business interruption resulting from lost business transactions. Since Internet transactions can be executed in great volume and quickly, the business interruption potential can be very large.

When using the RAID approach to an electric power system, the system represents a very large investment in equipment, sometimes as much as $600 per square foot of e-business space. The good news is that a properly engineered RAID system is extremely reliable, with availability exceeding 99.999 percent. Therefore the severity in terms of business interruption and equipment damage may be substantial, but frequency ought to be correspondingly low.

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All recommendations are general guidelines and are not intended to be exhaustive or complete, nor are they designed to replace information or instructions from the manufacturer of our equipment. Contact your equipment service representative or manufacturer with questions.
One last word about a RAID architecture power generation system: these are justified only by the very largest, mission critical e-business locations. They would include large on-line banks, credit card processing centers, major Internet services, and the like. Not every computer backup system qualifies for treatment as a similarly high availability power system.

Battery-dependent uninterruptible power systems, even when backed up by emergency generator sets are not in this class, and do not have the same reliability.

Summary
The dominant characteristic of e-business is efficiency and productivity. When compared to conventional brick and mortar facilities, e-businesses can produce very high revenue per employee or per square foot of floor area. That is the good news. The bad news is that significant loss of electronic capability, whether due to loss of power or loss of cooling, can produce equally dramatic business interruption losses.

Prudent management of an e-business asset dictates that power supply and equipment cooling receive the attention and maintenance that reflect its revenue potential.

About the Author
Robert Weir, a director with The Hartford Steam Boiler Inspection and Insurance Company, is a Professional Engineer and has an extensive background in the design and construction of power generation and industrial equipment and systems. A graduate of the U.S. Naval Academy, he holds a Master’s Degree in mechanical engineering from Worcester Polytechnic Institute and is a graduate of Suffolk University Law School. He is a member of the American Society of Mechanical Engineers (ASME), a permanent committee member of the National Fire Protection Association (NFPA 37), and is admitted to practice in Massachusetts and federal courts, including the U.S. Supreme Court. He is a registered patent attorney.