
Subtle peaks as well as major power surges can impair medical equipment



Preventing Power Surge Problems Is Key to Medical Device Operations

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Today's health care technology continues to gain advancements in complexity and speed. Imaging, monitoring and data management software and hardware have never been more capable. Yet, the advance comes at a price. Today's electronics often place a substantial drain on power supplies and in turn, they are susceptible to power related issues.

Hospitals and medical facilities utilize a wide array of voltage-sensitive equipment. Diagnostic technologies such as EKG, MRI and ultrasound, to name a few, require clean, consistent power with controlled leakage current and tight tolerances for voltage fluctuations. Unfortunately, electrical environments in health care facilities do not always provide these conditions.

A study conducted by IBM estimates a power surge of 100 to 1,000 volts occurs at least once per day in every electrical environment, possibly leading to system lock-ups, lost productivity and even catastrophic equipment damage or data loss. Surges can also degrade lighting, HVAC and elevator controls as well as chiller systems - each potentially leading to life-threatening problems quite apart from dedicated medical devices

Surge related issues result in nearly \$80 billion in losses for the U.S. economy, according to the Worldwatch Institute. These equipment-damaging electrical pulses are also a factor in patient care and the filling of landfills with harmful electronic waste due to equipment failure.

Surveying the Surging Damage

Why do good systems go bad? How can processors misread information and why don't these systems last as long as they're designed to last? It takes an expert to explain.

William Goldbach is a power quality and surge protection expert, and a Life Senior Member of the Institute of Electrical and Electronics Engineers (IEEE). Goldbach has spent the past three decades as an electrical engineer in the power quality field where he has worked to identify the relationship between clean power and control system performance. He spoke with DOTmed about why systems, including medical technologies, falter.

"There is no rocket science to this puzzle. Dirty power degrades and destroys electronics," Goldbach said.

Microprocessors read information through current pulses as binary code (zeros and ones). As equipment is turned on and off, voltage and current pulses, known as transients, are generated. These pulses of energy are distributed throughout every piece of equipment in the system.

"Depending upon the size and frequency of these pulses," he says, "the results will vary. As microprocessors try to function, these transient pulses of energy can cause lock-ups, or data can become lost or corrupted. In addition," Goldbach says, "larger pulses will cause catastrophic failure while smaller pulses degrade the life of these systems and controls."

Indeed, power load cycling generates over 80% of all damaging transients, internally. Less than 20% are generated externally by lightning or utility grid switching. Traditional surge protection simply does not provide enough of a safeguard. It takes sophisticated enhanced filtering to protect the life and performance of today's electronics.

A quality surge protector mounted at the main electrical service entrance will lower the energy of a large, externally generated surge. However, without enhanced transient filtering, a surge protector will do very little to address the hundreds of surges generated internally daily. These events happen in every hospital, business and home every day, leading to increased operating expenses.

Field Case Study Experiences

Doctors' office administrators and facility managers for hospitals, laboratories and clinics are under constant pressure to reduce operating costs especially in the face of recent reimbursement cuts. Therefore, getting the full life out of any equipment is a necessity. A comprehensive layered protection system covering all microprocessor-based equipment is a welcome help.

DOTmed followed some hospitals pursuing this goal. To properly guard electrical and electronic equipment, the hospitals implemented a staged approach for surge protection in their facilities by utilizing the services of Total Protection Solutions throughout critical areas of the hospital. The problems for each hospital ranged from damaged elevator control boards and occasional fuzziness on diagnostic images to

lock-ups and garbled data generated by lab equipment.

Following are notes from two institutions:

MeritCare Health Systems, Fargo North Dakota:

"CT virtually eliminated service calls due to downtime. Issues of parts usage, maintenance, and downtime have all greatly improved and that has also had a positive effect on patient relations," said James Durben, Director of Facilities Services. "For the X-ray equipment and Cardiac Cath Lab, results again have been excellent, no problems since installation. Besides direct costs of the damage, in the past we lost one week of revenue due to downtime, which also resulted in upset patients, doctors and management."

DMS Health Technologies (formerly DMS Imaging):

A national mobile diagnostic imaging provider of MRI, PET/CT, CT, Nuclear Medicine, Ultrasound, Cardiac/Angio, Bone Densitometry and Digital Mammography services, DMS Health Technologies experienced positive results by protecting their mobile fleet investment. DMS installed multiple mobile MRI systems with Total Protection Solutions to provide enhanced clean power to their coaches.

These are just two case studies that support advanced surge protection as vital to health care facilities. And if the right surge protection system is chosen, the overall savings more than cover the costs of the implementation of the new system.

Positive environmental impact is yet another benefit. By installing quality enhanced filtering protection, the life of all electronics will increase by approximately 50% and as a result of running on clean power, will reduce electronic waste or "e-waste". Extending equipment life is directly related to the reduction of hazardous e-waste in landfills. Items such as mercury lights and heavy metal circuit board electronics could contaminate the soil and eventually leach into drinking water supplies. The sustainability benefit of prolonging the life of electronics will also conserve natural resources including precious metals and rare elements.

Note: Richard McCrocklin contributed input for this report. Mr. McCrocklin is Founder and Director of Operations, CURE Medical Services.