

Protection Against Power Quality ‘Events’

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As global competition and a gyrating stock market pressure management, squeezing additional profits out of an established industrial process can spell the difference between success and failure. Poor electric power quality, as manifested by voltage sags (dips) and momentary interruptions (blinking lights), results in equipment and process down time costing US industry an estimated \$150 billion dollars each year. The highest costs accrue to the high-tech automated industry sectors, the very foundation of the new digital economy and US industrial growth.

Industry sectors with the highest cost of downtime include semiconductor, fiber-optic cable, and automotive manufacturing, as well as other continuous manufacturing process industries such as plastic extrusion, paper, food processing, and CNC machining. While UPS products are widely deployed as a solution in the PC and computer server markets, they have been difficult to apply in demanding industrial applications. As a consequence, the manufacturing sector has lacked an effective solution to the most common power quality problems or ‘events’.

Power quality ‘events’ most frequently result from unanticipated faults on the utility grid caused by occurrences such as lightning strikes, cars driving into utility poles, animals intruding into utility equipment, and equipment failing in a utility customer’s premises. Even when a utility’s protective fusing and breakers operate as designed, a severe fault condition will exist for a few cycles until the fault is cleared. It is precisely during this short interval, typically less than 3-10 cycles and perceived by human senses to be no more than a momentary flicker or blinking of the lights, that today’s digitally-controlled equipment and manufacturing processes shut down. Very frequently, the utility and their affected customer are both victims of circumstances beyond their control.

High-value industrial customers, such as semiconductor and automotive manufacturing plants, are fully aware of the power problems and frequently require their utility to either connect them to a ‘premium’ (transmission) grid at voltages of 120 kV or greater, or provide dual independent distribution utility feeds. For these high-value customers, virtually *all* power ‘events’ are of very short duration, lasting less than ¼ second each. However, the vast majority of customers (i.e., those fed from the distribution grid) are less fortunate. This is supported by EPRI’s Distribution Power Quality study which concluded that over 92% of all power ‘events’ are of short duration with only one or two events per year lasting for over several minutes.

It has been proposed that the utility’s performance or the utility reliability metrics be measured by the proportion of the time the utility voltage is out of its normal range during a year. This is described in the form of “nines” for example 99.9% represents 3-nines. Nevertheless, a more effective measure is the proportion of time during a year that a *process is down* as a result of a power quality event. For instance, if a ¼ second power ‘event’ caused a customer’s machine to be down for 2 hours, then did the event last for ¼ second or 2 hours? The answer is 2 hours. The reliability level effectively experienced by the premium grid customer is therefore decreased from over 7-nines (99.99999%) to approximately 2-nines (99%). For a normal grid customer, the reliability effectively decreases from 3-nines to 2-nines. One can see that for digital economy processes, the impact of power quality ‘events’ is severe and significant.

The *DySC*[™] (pronounced ‘disk’) from SoftSwitching Technologies, rated at 1.5 kVA to over 2,000 kVA, specifically protects sensitive equipment and manufacturing processes from deep voltage sags and momentary interruptions, the most common power quality ‘events’. The *DySC* is internationally patented, features 99.5% efficiency, has no batteries or energy storage coils, and has smaller size and lower cost compared with conventional solutions, and is specifically designed for demanding industrial applications. Particularly in ‘premium’ utility grid applications, the *DySC* protects against virtually 100% of all power quality events, resulting in a very high level of nines. Even in ‘normal’ grid applications, the *DySC* covers against over 92% of all events.

The *DySC* is a mature product, currently protecting critical processes for blue chip customers in the semiconductor, automotive, and fiber-optic cable manufacturing industries. It is also being applied in other mainstream applications including plastics, food processing, cement, steel, HID lighting, and for computer systems. Visit SoftSwitching’s website at www.softswitch.com or call us at 608-836-6552 for further information.