Perry Schugart,
Sr. VP Power Systems Marketing

PROTECTING PEOPLE, PROPERTY AND PROFIT

SILICON POWER CORPORATION
We are working on a fast-resettable fault current limiter, when a fault occurs a reactive component is inserted within a hundred microseconds into the transmission, or distribution, network to limit the fault current without complete disconnection.
With the increased use of sensitive electronics in critical operations/facilities, the need for higher levels of power resilience/quality is advancing at a compounded growth rate. Loads are becoming increasingly more sensitive to power quality events (glitches) as their controls become more sophisticated and their integrated power supplies are cost reduced. The dynamics of the grid are also changing with the increased penetration of renewables, like solar and wind, and large-scale energy storage systems. The result of this increased penetration is less rotational inertia in the grid to help smooth-out/ride-through power quality events. Historically, Medium Voltage (MV) mechanical transfer switches have been used for many years to transfer a facility from one power feed (primary) to another power feed (alternate) when a glitch impacts the facility. These mechanical transfer switches, or automatic transfer switches, have lacked the necessary control, speed and current capacity to adequately support today’s critical loads. Energy storage solutions are problematic due to their large size, high cost and environmental impacts. As a result, critical operations/facilities can be crippled at any moment by a common, everyday event.

In 1995 Silicon Power fielded the first MV, sub-cycle (under ¼-cycle) transfer switch based on their advanced, high power semiconductor devices and controls. For over 20 years, Silicon Power has deployed and refined this solution to provide uninterrupted operations for mission critical power needs in various applications (e.g. pharmaceutical, airport, semiconductor, automotive, chemical, government, and data/financial). Silicon Power aims to use their product set to ensure “uninterrupted operations for critical facilities,” and meet the increasing need for more reliable and efficient power.

Perry Schugart, Sr. VP Power Systems Marketing, elaborates with some examples, “You see it in manufacturing segments such as pharmaceuticals, food and beverages, and automotive; data centric segments like financial and data centers; and transportation where a single airport event can disrupt travel globally. If there’s a glitch in the power line, an entire facility can come to a halt and cause millions of dollars in losses and unsafe working environments. People are a company’s greatest asset, we’re all about protecting people, property and profit for our customers. Even a momentary power glitch can result in loss of control for equipment like gas-fired ovens (allowing them to thermally runaway) and loss of vacuum that is holding material in place as it moves around a facility; this puts peoples’ safety at risk. There’s also the toll on equipment and materials from an uncontrolled shutdown. Affected equipment usually requires cleaning,
maintenance and possibly recalibration; materials that were work in process may need to all be scrapped, and ultimately these results negatively impact schedules, customer satisfaction and bottom-line profits.

This is one of the effects we’re seeing between the increasing sensitivity of the loads and the changing dynamic of the grid from increased penetration of distributed energy resources like wind, solar and energy storage, which results in less rotational inertia in the grid due to their inverter-based technologies. For facilities with power sensitive loads and for critical facilities, the inability of the grid to meet their power quality needs highlights the importance of a better solution”—Silicon Power is focused on increasing the resilience of your power network. They want to be the people empowering higher levels of power reliability and performance. True to the classical definition, energy on its own doesn’t lend much value, energy must do work. That’s when it becomes power. The profile needed for transforming energy to power is aggressively becoming more refined due to the changing load and grid dynamics. Insufficient power quality can adversely impact our financial, manufacturing, transportation and service industries. Solutions that were previously tolerable, like automatic transfer switches, are not able to perform at the level required for today’s sensitive power loads. Silicon Power does it much faster. A typical automatic transfer switch could take six cycles to transfer, which is too slow for today’s sensitive power “loads”—“ Silicon Power’s Innova™ STS Sub-cycle Transfer Switch does it in a quarter cycle for 3-phase sags/swells/outages. Their solution allows a lot of customers to be very successful with respect to riding through these situations that before really were detrimental to their bottom-lines.

Unleashing the Power of Solid-State Switching Technology
Silicon Power is a vertically integrated company that designs and manufactures high-power semiconductor devices, pulsed-power modules and utility-applicable systems. The devices themselves are designed to be modular, which can be used to build large systems, that can be tailored to suit the performance and functionality required. Silicon Power’s products are also extremely heavy duty, designed to deliver beyond the capabilities of typical off the shelf semiconductors. Silicon Power’s products are focused more on mission critical, industrial and utility applications.

Silicon Power’s Innova STS sub-cycle transfer switches are a power quality solution that maximizes the resilience of your power network, empowering higher levels of productivity. The Innova STS is a proven solution that has become essential for a growing number of businesses and industries globally—empowering higher levels of power reliability and performance. The Innova STS is designed for large commercial/industrial power consumers who have access to two or more independent medium voltage power feeds. It detects sags, swells, momentary and sustained interruptions, and automatically transfers the load to the alternate power feed within a quarter cycle—faster than other technologies. When compared to other approaches such as large-scale UPS/energy storage systems, the Innova STS is the most cost-effective solution with substantially lower upfront and lifecycle costs, smaller footprint and higher 99 percent efficiency, compared to 97 percent for energy storage systems. Without the additional costs associated with batteries, their maintenance, replacement and disposal of, which gets quite expensive as you go down the years, the Innova STS is the clearly the best economic and environmental solution.

In a typical application, Greenfield or Brownfield, the customer’s power network is studied to define the best solution. A typical Innova STS unit is 12 feet by 14 feet by
12 feet—a cube, which can go either outside or inside of an existing structure. This unit would support a whole manufacturing facility, industrial complex or data center. They also offer other solutions that are dedicated for a community of users called a premium power part, where everyone gets to enjoy this higher level of power, quality, and resilience.

Solutions for Applications Across the Board
Critical facilities form the bulk of Silicon Power’s Innova STS clientele—pharmaceuticals, financial institutions, data centers and automotive manufacturing plants.
Semiconductors are also big due to the high costs of wafer processing. With increasingly complex tools and process steps needing to be tightly controlled in a wafer fab, even a minor power glitch can be very disruptive. As soon as a wafer fab loses power, they usually must scrap everything in their production line, which is quite costly.

Visteon, a manufacturer of automotive electronics, was experiencing as many as 17 power quality disturbances per year. Because of the sensitivity of their automated control systems, even the slightest aberration in the power supply would shut down their operation, threatening delivery deadlines and productivity. Working closely with Visteon, the local utility determined that an Innova STS sub-cycle transfer switch offered the most viable solution. The utility system serving the plant is a 34.5 kV. Initially there was some concern about a 38 kV switch, since there were no other switches in service at this voltage. However, based on previous successful Innova STS installations at other distribution voltages, it was decided to move forward with the project. The system designed for this application includes a 38 kV, 600A, 6 kA fault duty Innova STS in an outdoor enclosure integrated with a bypass switchgear package. This first 38 kV Innova STS, and being the largest in commercial service at the time, was installed at the Visteon facility in Lansdale, Pennsylvania, on December 14, 1998. Since the Innova STS was installed, the company did not experience further power interruptions up until plant closure in 2009.

Into the Future of Power Electronics
To Silicon Power, it’s all about building that visibility in the marketplace that a solution exists for their power resilience needs. The company has recently re-launched their product line about a year ago. They have been receiving a great deal of visibility within the utility community as well as in industrial, airport, and pharmaceutical sectors. Silicon Power is keen on receiving and working with customer feedback, to answer questions like: Where are their pain points with respect to power quality? What do they need in terms of resilience? Silicon Power has been extremely effective in providing uninterrupted operations to facilities with sensitive power loads for over 20 years.

Looking a bit into the future, Utilities want to use more of their network capacity, but they can’t because of the related higher fault current, it will damage the downstream components. Schugart adds, “We are working on a fast-resettable fault current limiter, when a fault occurs a reactive component is inserted within a hundred microseconds into the transmission, or distribution, network to limit the fault current without complete disconnection. After the fault has cleared the reactor is removed just as quickly. The resettable capability provides faster recovery after fault clearing as well as no replacement parts required after the fault limiting operation. This is a great example of where high voltage, high current and high speed all come together.”

“Silicon Power is focused on increasing the resilience of your power network”
Silicon Power Corporation

TRANSMISSION AND DISTRIBUTION SOLUTION PROVIDERS 2020

The annual listing of 10 companies that are at the forefront of providing Transmission and Distribution solutions and impacting the industry.