Fundamental to all but the most rudimentary manufacturing endeavor, the electrical systems category includes everything that keeps modern plants running: electrical power and distribution systems; electrical control and protection; motors; generation and conversion; wiring and accessories; and enclosures, in addition to numerous sub-categories.* And with all eyes on sustainability today, the use of these systems in manufacturing has never been under more scrutiny.

Electricity usage trends underscore the need to use less of it for reasons that include cost reduction, environmental protection and the assurance of reliable power in years to come. According to energy solutions provider ABB, industrial electricity consumption now accounts for about a fourth of all electricity produced worldwide, with percentages climbing everywhere. The largest increases have taken place in emerging Asian countries, especially China, where the share of electricity in industrial energy consumption doubled (from 10% to 20%) between 1990 and 2009.

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A quick route to reduced electrical consumption in manufacturing is to use energy-efficient

motors (see “Technology Showcase,” Maintenance Technology, July 2011). The federal government addresses motor efficiency with the Energy Independence and Security Act (EISA) that became effective last December. Among other provisions, EISA boosts efficiency requirements for all general-purpose, three-phase AC industrial motors from 1 to 500 hp manufactured after December 19, 2010, and intended for sale in the U.S. For manufacturers looking to replace older, less-efficient motors, EISA makes it easy to find models guaranteed to use less electricity.

Electrical-system automation, particularly systems that power HVAC, lighting and other facility services, is another sustainable trend within the category. Holistic solutions that track input from hundreds of electrical uses and control them based on human need, biometric conditions and energy consumption lead the trend. In production, automated systems that monitor and adjust power for optimal use are gaining acceptance as a way to improve efficiency, particularly in areas with less-reliable grids.

Manufacturing’s demand for ever larger amounts of electricity has also enhanced the focus on electrical safety, notably with regard to the growing instances of arc flash. A dangerous byproduct of high-voltage systems (above 120V) when an abnormally large “fault current” flows through a circuit, arc flash is an unexpected and often deadly burst of electricity. Concern about arc flash has led to passage of at least four industry standards designed to reduce its occurrence. It has also created widespread industry emphasis on training to help workers understand arc flash and how to protect themselves from it. Various products—*warning labels, fuses, personal protective equipment and enclosures with multiple openings, among others*—have been introduced or modified to help workers avoid arc-flash danger. Nonetheless, arc flash is expected to remain an ongoing safety challenge for high-voltage users in manufacturing, even as systems become more efficient and more intelligently controlled.
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Rick Carter, Executive Editor

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