INDUSTRY 4.0 AND POWER QUALITY

The concept of “Industry 4.0” derives from an innovative further development of production processes made possible thanks to new technologies. The aim is to harness efficiency potential and thus make production more cost-effective, but also to achieve increased flexibility, an important advantage in terms of global competition.

The Industry 4.0 initiative is being applied to electrical machinery to facilitate remote diagnostics, remote maintenance, and remote data capture. Such initiatives have increased the need for data centers, servers, and communication systems. This is driving the market for power quality equipment in the industrial and manufacturing segment to grow significantly as the need for protection systems for critical equipment is growing.

The basic principle of Industry 4.0 is that by connecting machines, work pieces and systems, businesses are creating intelligent networks along the entire value chain that can control each other autonomously.

Industry 4.0 creates what has been called a "smart factory". Within the modular structured smart factories, cyber-physical systems monitor physical processes, create a virtual copy of the physical world and make decentralized decisions. Over the Internet of Things, cyber-physical systems communicate and cooperate with each other and with humans in real time, and via the Internet of Services, both internal and cross-organizational services are offered and used by participants of the value chain.

There are four design principles in Industry 4.0. These principles support companies in identifying and implementing Industry 4.0 scenarios.

- **Interoperability:** The ability of machines, devices, sensors, and people to connect and communicate with each other via the Internet of Things (IoT) or the Internet of People (IoP). Adding IoT will further automate the process to a large extent.
- **Information transparency:** The ability of information systems to create a virtual copy of the physical world by enriching digital plant models with sensor data. This requires the aggregation of raw sensor data to higher-value context information.
- **Technical assistance:** First, the ability of assistance systems to support humans by aggregating and visualizing information comprehensibly for making informed decisions and solving urgent problems on short notice. Second, the ability of cyber physical systems to physically support humans by conducting a range of tasks that are unpleasant, too exhausting, or unsafe for their human co-workers.
- **Decentralized decisions:** The ability of cyber physical systems to make decisions on their own and to perform their tasks as autonomously as possible. Only in the case of exceptions, interferences, or conflicting goals, are tasks delegated to a higher level.

There are differences between a typical traditional factory and an Industry 4.0 factory. In the current industry environment, providing high-end quality service or product with the least cost is the key to success and industrial factories are trying to achieve as much performance as possible to increase their profit as well as their reputation. In this way, various data sources are available to provide worthwhile information about different aspects of the factory. In this stage, the utilization of data for understanding current operating conditions and detecting faults and failures is an important topic to research. e.g. in production, there are various commercial tools available to provide overall equipment effectiveness (OEE) information to factory management to highlight the root causes of problems and possible faults in the system. In contrast, in an Industry 4.0 factory, in addition to condition monitoring and fault diagnosis, components and systems can gain self-awareness and self-predictiveness, which will provide management with more insight on the status of the factory.

Implementation of Industry 4.0 will introduce challenges to the electronic infrastructure that will lead to the requirement to improve the levels of power quality in industry.

A few of the main challenges are:

- IT security issues, which are greatly aggravated by the inherent need to open up those previously closed production shops.
- Reliability and stability needed for critical machine-to-machine communication (M2M), including very short and stable latency times and continuous productivity.
- Need to maintain the integrity of production processes.
- Need to avoid any IT snags, as those would cause expensive production outages.

All these requirements are creating a growing demand for protection systems for electronic devices, non-uniform power quality and network reliability issues, rise in alternative energy programs, and power quality standardization. The consequences of power disturbances/blackouts or poor power quality impact critical power buildings on the level of business continuity, costs and safety.

We must keep in mind the essential concept of power quality:
Power Quality relies on the creation of a near perfect electric power supply environment, one that is always available, has an almost pure noise-free, sinusoidal wave shape, and is always within voltage and frequency tolerances, allowing the connected loads to operate normally and free of any electrical disturbance.

The industrial and manufacturing segment is expected to hold the largest share of the power quality equipment market.

The power quality equipment market can be segmented into surge protection devices, harmonic filters, power conditioning units, power distribution units, uninterruptible power supply, synchronous condenser, voltage regulator, digital static transfer switch, static VAR compensator, solid oxide fuel cells, isolation transformers, and power quality metering.

Uninterruptible power supply systems are expected to have the largest market soon, and according to a recent report by Markets and Markets the growth in the surge protection market is expected to grow at greater than 5% CAGR between 2017 and 2022.

Power quality is an essential part of Industry 4.0. Putting it another way: without power quality overall at the center of Industry 4.0 there is no Industry 4.0.

Energy Control Systems has been providing power quality products and solutions for more than 30 years. Our globally diverse group of clients include automotive facilities, oil and gas, food and beverage, telecommunication and manufacturing industries.

Let us be your partner in the planning and implementation of a successful Industry 4.0 project. With our complete range of UPS, harmonic filters and surge protection products; we can help you in preserving the reliability of your electronic infrastructure.

Contact us today at **800.383.6956** or **817.483.8497** or via email at **info@ecsintl.com**
5500 E. Loop 820 #205; Fort Worth, Texas 76119 USA
www.ecsintl.com

Some of the above may be found in: Wikipedia: Industry_4.0

ECS
Energy Control Systems