

Industry 4.0 Electric Motors

Industry 4.0 Electric Motors

There is quite a bit of new jargon that seems to be thrown around in manufacturing today, including Internet of Things (IoT), Industrial Internet of Things (IIoT), smart factories, and Industry 4.0. Is this something you need to know about? Can it make a difference in your factory? Below, we attempt to answer those and other questions.

What is Industry 4.0?

Industry 4.0 refers to a fourth revolution in the manufacturing industry. The overarching goal of Industry 4.0 is to create a smart factory that ties in **IIoT (Industrial Internet of Things)** with **PdM (Predictive Maintenance)** in order to increase efficiency, maximize productivity, and minimize downtime.

Industry 4.0 goes well beyond adding computers to the manufacturing process (a stage sometimes referred to as Industry 3.0) by including data not just for the process itself but to aid in decision-making, inform maintenance, identify patterns, and streamline operations. Implementing Industry 4.0 also helps predict workplace hazards in real-time, helps with supply-chain decisions, predict disruptions due to maintenance potential or equipment failure.

What Are Smart Factories?

It takes more than just data to make a factory into a smart factory. Equipment, including motors, must not only be able to monitor the factory and communicate the data collected but also make decentralized decisions that impact factory performance. The systems within the factory become their own

Internet of Things (IoT) as they communicate. These same systems also communicate with humans in the factory wirelessly via real-time.

Here's another way to think about it:

- Real-world performance data for your factory is gathered from your factory's equipment, including the electric motors that are so crucial to your operation
- That data is analyzed by intelligent systems that can recognize patterns that humans are likely to miss simply because of the sheer amount of data involved
- These intelligent systems can make recommendations for improving productivity and efficiency, predict impending equipment failure, recommend the optimal time to perform maintenance, and much more

Again, the goal of a smart factory is to maximize productivity and minimize downtime. And contrary to what many people assume, having a smart factory doesn't mean that humans aren't needed anymore. Rather, the smart factory supports you and your team by providing data that helps all of you make more informed decisions.

How Does Industry 4.0 Impact Electric Motors?

Electric motors are a major part of just about every manufacturing process, so it makes sense that there would be Industry 4.0 electric motors. One of the features of an Industry 4.0 motor is the ability to perform its own condition monitoring around the clock, which also allows it to predict failures well in advance.

By predicting impending failures, technicians are able to take corrective actions, thus minimizing downtime, reducing the costs of repairs by avoiding costly breakdowns, and optimizing maintenance costs by only performing maintenance when it is actually needed.

When Industry 4.0 motors are combined with other equipment and sensors, they become a key factor in recognizing patterns regarding equipment

productivity, efficiency, maintenance, and failures. Here's the bottom line for Industry 4.0 Electric Motors: they allow you to ...

- Keep your motors running at peak efficiency
- Perform maintenance when it is needed
- Avoid costly repairs by addressing problems before they develop
- Reduce M&O costs

How Does Industry 4.0 Technology Work With Motors?

Let's look at an example from **Oracle**. They took a small AC motor out of an industrial machine and magnetically attached a 3-axis vibration sensor to it. This type of vibration sensor can transmit motion data upon which **vibration analysis** can be performed. The sensor had built-in WiFi which was used to transmit data to the gateway. The gateway then passed the data to the cloud (in this case, Oracle IoT Asset Monitoring cloud) where it could be analyzed and studied by artificial intelligence.

Not only can this data provide a baseline for future reference but it can be used to detect anomalies with the motor that might be indicating a failed bearing or imbalance. In their example, the researchers were able to discover that their motor had a bad bearing -- just through the data gathered by the motion sensor. And because this data can be streamed 24/7, anomalies such as those caused by a bad bearing can be detected far more quickly -- and be addressed before they start causing cascading damage to other components with the motor.

Here are a few examples of Industry 4.0 components and vendors to improve the efficiency of your operation.

Waites Wireless

The **Waites Wireless** solution provides monitoring of vibration and temperature on a very robust level! The gateway connects to the internet and

then to the nodes and sensors that are on your machine. Waites Wireless has a tremendous interface with a lot of data at your fingertips. Sensors and equipment have proven to be very reliable.

ITT i-ALERT2 Equipment Health Monitor

The **ITT i-ALERT 2 Equipment Health Monitor** provides monitoring of vibration and temperature for rotating machinery, including electric motors. It provides comprehensive, easy to use reports that you can access from a phone or tablet. This particular monitor is easy to install and can be configured to alert you when something goes wrong.

WEG Motor Scan

In 2018, WEG introduced an Industry 4.0 solution for electric motors. While it may not be an Industry 4.0 motor, WEG now manufactures the **WEG Motor Scan**. The Motor Scan is a device that enables the periodic monitoring of electric motors. In addition to monitoring and wireless transfer of data to the cloud, the Motor Scan has an app compatible with both Android and Apple devices that allows users to monitor multiple motors at the same time, and even on the same screen. This is an excellent start in implementing Industry 4.0 in your factory. Even a small scale start like this would have a positive impact on your M&O costs.

Siemens Simotics IQ

If you have Siemens motors, then the Simotics IQ will be of interest to you. When used with low-voltage motors such as those in the Simotics SD product line, the motors are fitted with a compact sensor box that gathers technical motor data that includes operating and condition parameters. That data is transmitted to the cloud by Wi-Fi where it can be analyzed by MindSphere or Simotics IQ to provide actionable information on motor performance and condition.

Nidec Forecyte

Nidec Forecyte is another IIoT stand-alone remote equipment monitoring platform. The system utilizes wireless sensors that measure and track temperature and vibration. The resulting data is transmitted to the cloud where it can be viewed from any device with Internet access and a browser. This real-time data visualizes deteriorating equipment health.

ABB Ability Smart Sensor

Another example of IIoT technology that can be used with electric motors is the **ABB Ability Smart Sensor**. It allows you to take a traditional electric motor and turn it into a IIoT-enabled smart motor. The sensor merely attaches to the motor frame; from there, it transmits motor health and operation (primarily based on vibration and temperature readings) to the cloud or to a server.

TECO - Westinghouse Pro3200

The **TECO Westinghouse Pro 3200** is a portable vibration analyzer designed for use with rotating equipment that has anti-friction bearings, including electric motors. The particular IIoT system is portable and transmits data via Wi-Fi where it provides analysis and, if needed, diagnosis based on the data. The data itself is gathered via vibration sensors that easily attach to the frame of the motor.

HECO Knows Industrial 4.0

At HECO, we like to encourage customers to take advantage of the powerful new Industrial 4.0 technology. Our primary interest is in Industrial 4.0 electric motors and how the data gathered can be used to inform **PdM (Predictive Maintenance)**. We can help you select the sensors and devices that not only fit your budget but will help you make informed decisions about your electric motors. Our knowledgeable team can also help you implement these tools as a part of predictive maintenance. If you are interested in applying the concepts discussed in the article to the motors in your facility, contact us today.