industrial technology

author: andy selvy

WATLOW®
Powered by Possibility

Right Data, Right Place, Right Now

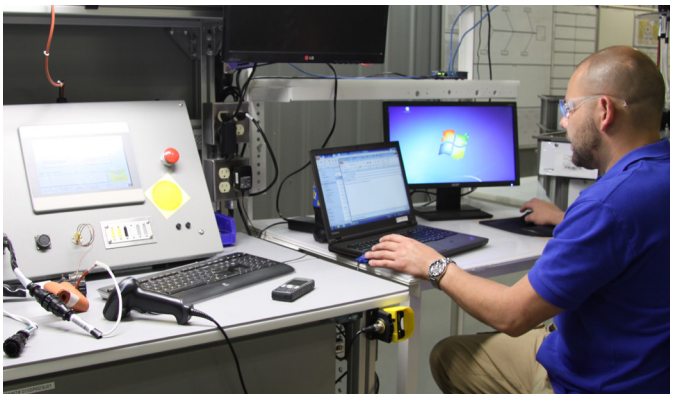
Why Using Industry 4.0 Tools Requires Not Just Technology Know-How, But Industry Knowledge, Too

Summary:

Industry 4.0 technology enables the capture and processing of data in real time, both where it is generated and where it is needed, to implement effective improvements to manufacturing processes. Capturing data, though, is not enough. Sensors must be placed in the locations where they will be most effective, and the data itself must be interpreted by knowledgeable professionals who understand what the numbers indicate. The advantage Watlow® brings to an Industry 4.0 project is in its thermal experts, who understand both the important role thermal systems play in key application and Industry 4.0 implementations.

Our Customers Benefit From a Century of Experience

Industry 4.0 is a term for a fourth type of revolution taking place in several industries, bringing together technologies to create production facilities that are more integrated, automated and productive. In a previous white paper, we outlined several stages of Industry 4.0 development and noted that, in many industries, companies have not moved beyond a few initial pilot projects.



That is beginning to change as more and more companies are coming around to the idea of "smart factories" and are partnering with vendors that appear to have deep expertise in the requisite technologies: Big data analytics, cloud software, edge computing, cognitive technologies and so on.

The one element that is usually missing, however, is the most important one: A deep understanding of the industrial processes in question.

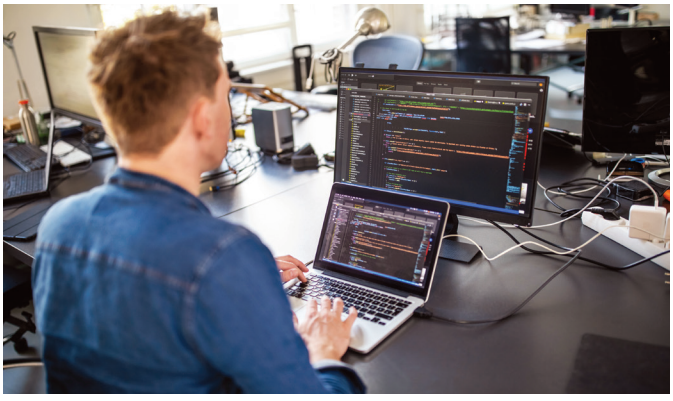
In our own Industry 4.0 engagements, including several in-house projects we have implemented within our own manufacturing centers, we have come to understand that this kind of deep understanding is critical for bringing more modern technological tools to bear on existing industrial processes. It is precisely because Watlow has nearly a century's worth of thermal systems application know-how that we have been able to successfully implement so many of our own Industry 4.0 projects.

In this white paper, we outline exactly what this means for our clients, and how that deep industrial knowledge makes an Industry 4.0 project with Watlow look and feel different.

Why is Specific Industry Knowledge Needed in an Industry 4.0 Project?

Much of the benefit of Industry 4.0 technology comes from the real-time collection, transformation and use of data from multiple points in the facility. We can think of Industry 4.0 technology the way we think of any other diagnostic tool—for example, a well-made, professional-quality doctor's stethoscope.

A stethoscope can absolutely be used to detect problems—*if* the person trying to detect a problem knows something about the body to begin with. Hand your five-year-old the stethoscope, and she may know enough to place it on your chest to listen to your heart. But is it on the right place on your chest? Is it positioned on the tricuspid or mitral listening post? If not, she cannot hear your heartbeat properly.



If she does position it correctly (maybe she has been paying close attention during those pediatrician visits), does she know what to listen for? She can certainly hear the lub-dub of your heartbeat. But can she recognize a mid-systolic click? Does she know that such a click, accompanied by a late systolic murmur, is an indication of mitral valve prolapse?

Probably not. The same disparity can happen with Industry 4.0 as well. While high-end sensors can be used to gather data, making the best use of those sensors and the data they provide requires professionals who know the particulars of an application, and have training and experience with both the sensor and the signals it produces. It requires someone who knows what points in a tool or process generate the most significant data, who knows just where to place the sensor for optimum results and who knows how to manage, protect and analyze the data once it is collected.

One could argue that, just as doctors know how to use stethoscopes, large technology companies know how to use data collection and analysis tools (and other Industry 4.0 technologies). But again, *knowing something about the body in question* is equally important. A doctor might know what to listen for in *your* heart but could be thrown if they had to use that same stethoscope on your dog. Your veterinarian, however, would not be—the veterinarian is trained to know what to listen for in animals.

In short, *knowing the tool is not enough*. You also must know a lot about the systems to which those tools are attached.

What is Possible in Industry With the Right Data Capabilities

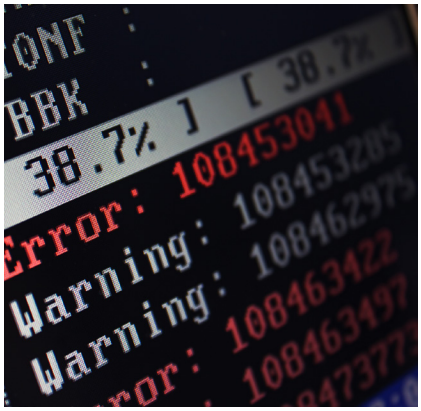
Industry 4.0 technologies open a wide vista of quality and process improvement possibilities for an organization that is undertaking such an initiative. When implementing Industry 4.0 technology to a manufacturing setting, there are three main stages to what data is generated and how it can be processed and used.

Stage 1: Visualization (Basic Data-Gathering)

The earliest step of an Industry 4.0 implementation is simply gathering data from the critical points in the production process and using that data to gain a view into what goes on at those key junctures. This level of information and insight provides you with a dashboard showing a real-time or near-real-time image of performance for the process. For example, if you were applying this level of implementation to a thermal system leveraging a heat exchanger, you would be able to track temperature changes in the system to monitor increases and decreases in the process temperature and ensure safe and efficient operation, and you could schedule system maintenance based on elapsed time (e.g., changing fluids monthly, disassembling and cleaning the heater bundle every three months, etc.).

Stage 2: Interpretation (Active Monitoring and Data-Based Action)

Once data collection is fine-tuned (best location for the sensors, which data points to consider, etc.), the focus shifts from simply collecting and viewing data to see what is going on in the system to full-on remote monitoring of the system to take immediate action whenever necessary. Using the heat exchanger system example again, Industry 4.0 technology in this stage can be used to set alarms so that if temperature levels fluctuate above or below an established range, an operator is automatically notified of the situation and can take appropriate action.



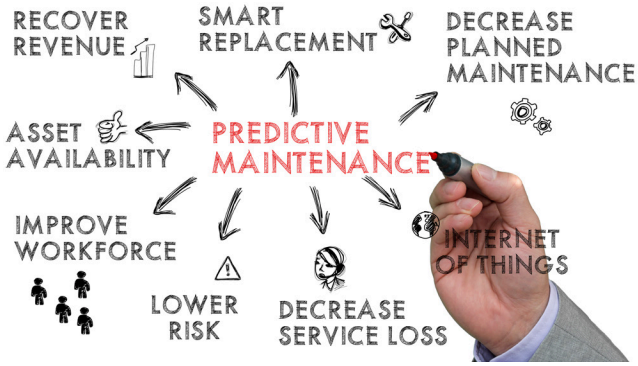
Data can also be used after an event to diagnose what is going on, and why. To take the above example, why did temperature levels fluctuate? Was it random, or did it occur at a certain stage of the process, or when an event occurred? Knowing this, could the fluctuation be prevented?

In Stage 1 we could see and document that the process temperature spikes sharply after about six hours of runtime, so adjustments can be scheduled for six hours into operation every day. In Stage 2, the system immediately notifies the lead engineer whenever the temperature starts spiking—whether it is six hours in, eight hours in, etc.—so that the cause can be ascertained, and adjustments made when the temperature shifts occur (rather than guessing when they occur).

Stage 3: Predictive Maintenance

In this stage, the reactive responses in Stage 2 become proactive instructions. This is where the more aspirational promises of Industry 4.0 really begin to take form.

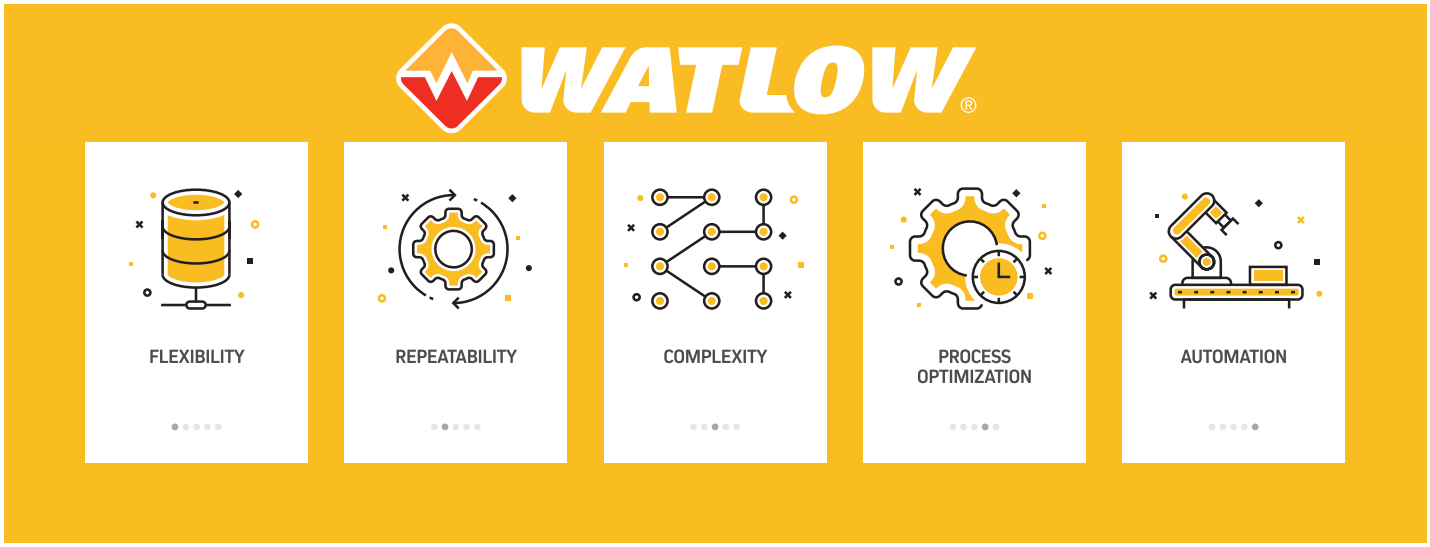
A good example comes from an in-progress project looking at the exhaust lines in a semi-conductor fabrication plant. Certain sections of the gas lines are prone to particle build-up, resulting in unplanned maintenance-related downtime. A substantial amount of data has been collected and analyzed, and instead of issuing alarms for staff to react to, the data indicates that implementing better thermal uniformity at a key stage in the production process greatly reduces (or ultimately eliminates) the clogging issues. This not only eliminates costly downtime associated with maintenance cycles but increases overall productivity – a big win all around!



At the same time, if something has occurred in the gas lines that is causing the build-up to occur more quickly, a predictive model can alert the operator that build-up is reaching a level where maintenance is required sooner—avoiding any unexpected breakdowns that might otherwise occur.

An Experienced Leader in Industry 4.0 Technology

Watlow is currently piloting and implementing a broad range of Industry 4.0 technology programs. Leveraging these leading-edge technologies, we are automating data-gathering and analysis to anticipate issues earlier and speed up implementation of solutions. Moreover, growing our experience with Industry 4.0 has not only increased the efficiency and productivity of our operations, but it has also helped us develop the critical knowledge to assist our customers in implementing their own Industry 4.0 solutions so that they can realize the same benefits.



Takeaway: Industry 4.0 is More Than Data Collection

While data collection is an important first step in turning a facility into a "smart" factory, *it is collecting the right data and turning it into valuable information that counts.* Applying Industry 4.0 technology and principles to a production line yields insights and creates efficiencies by:

- **Increasing uptime**
- **Increasing yield**
- **Reducing cost**
- **Reducing variation**
- **Reducing risk**
- **Improving performance**

Watlow is actively exploring and implementing Industry 4.0 technologies to continually improve productivity and increase quality in our own products and processes, and we are leveraging the things we are learning with our clients as well.

Drawing from our nearly 100 years of manufacturing experience we are well positioned to continue learning from the deeper insights made available through Industry 4.0 technologies. Watlow can show you how to collect, manage, protect and transform your own production data to realize substantial improvements and success.

If you are a large, multi-site manufacturing company please connect with a Watlow sales engineer who can share some of our insights to determine if we would be helpful for your own production efforts.

Not a fit? Please see some of our other information related to Industry 4.0 below.

Further Reading

The Three Stages of Industry 4.0 Adoption: Understanding the Different Kinds of Industry 4.0 Implementations
(white paper)

Leading Transformational Change for Ourselves and Our Customers with Industry 4.0 Applications
(white paper)

Further information is available at: www.watlow.com