controldesign.com

control design

FOR MACHINE BUILDERS

THE OEM'S GUIDE TO Integrating Remote Monitoring

How machine builders of all sizes can improve fleet efficiency, accelerate product development, reduce costs and improve customer satisfaction and profitability by plugging into the Industrial Internet of Things

Sponsored By

GE Intelligent Platforms

PutmanMedia®

Table of Contents

End user challenge = OEM opportunity

Massive demographic and technological shifts are challenging manufacturers to do more with less while squeezing every ounce of efficiency and profitability out of their operations. These same trends are providing a unique opportunity for smart OEMs to provide higher levels of service, quality and expertise—all while creating new revenue channels—through the integration of remote monitoring. Many small to midsized OEMs believe it is beyond their capability or expertise to offer advanced remote monitoring and predictive maintenance services on their machines. In fact, the confluence of plug-and-play connected field monitoring equipment, secure internet-enabled cloud computing, simple data analysis tools, and subscription-based monitoring services has put this crucial capability within reach of all machine builders who have the desire to provide this valuable and profitable service.

In this Special Report, we will provide an overview of remote monitoring and explain how even the smallest OEM can improve performance, fast-track machine development, reduce costs, and increase revenues and customer satisfaction by integrating remote monitoring into their machines. We will also provide a compilation of recent remote monitoring articles from the archives of Control Design. Finally we will present a case study of one company that has seen success with remote monitoring.

Contents

The Machine Builder's Guide To Remote Monitoring

Plug-and-play services create new growth opportunities for OEMs of all sizes

By Steve Diogo

Remote monitoring is the use of connected machines to collect and deliver machine-specific or fleet level data that can be analyzed by OEMs to:

- Identify existing performance discrepancies;
- Predict potential downtime events to identify problems and deliver service before they occur;
- Assess customer compliance with preventive maintenance;
- Improve the product development cycle by identifying where to add reliability to deigns or remove costs; and
- Create new revenue streams through service agreements and consulting.

Implementing a successful remote monitoring system requires three things: Secure data collection, storage and transmission that protects the OEM's and customer's data; analytics software that allows OEMs to identify relevant data; and a channel to get the right information to the right person at the right time. Some OEMs may be overwhelmed by the thought of developing such a system. But off-the-shelf systems such as Equipment Insight from GE Intelligent Platforms can put remote monitoring capabilities within reach for even the smallest machine builders.

Why remote monitoring? Why now?

Worldwide, manufacturers are under ever increasing pressure to compete in a market whose workforce and technology are being revolutionarily transformed. It is estimated that as much as 40% of the existing skilled manufacturing workforce will retire by 2020. Vast stores of knowledge essential to efficient plant operation will leave along with these educated workers. In response, manufacturers are seeking ways to limit the impact of this resource drain, and it is certain that many vacated positions will not be filled. Manufacturers are looking to technology—and their OEMs—to fill the void by providing tools for improved efficiency, productivity and profitability.

Add to this the explosion in the number of connected machines in factories and increased pressure on manufacturer CIOs to run more efficient operations through effective data analysis, and you have the makings of a radical transformation in the way manufacturing business is conducted. With connected machines, manufacturers expect to be able to do more with fewer resources; and that means they will be replacing only a small percentage of the positions that will be opened up through retirement.

In this new paradigm, manufacturers are already putting pressure on OEMs to provide solutions. According to Steve Pavlosky, Equipment Insight Solution Leader for GE Intelligent Platforms, OEMs who can answer this challenge will be the winners in this new world.

"OEMs are being challenged to provide solutions for manufacturers' increasing demands for cost-effective service," Pavlosky says. "The good news is that the new workers who will be filling positions on the plant floors are more tech savvy. They're using technology to drive productivity in their personal lives; they expect to be able to do the same in their professional lives."

Benefits of remote monitoring

Like most technology advancements today, remote monitoring is not something OEMs need to design from scratch. Remote monitoring has been possible for 25 years. Today's out-of-the-box systems are largely the result of iterative improvements in communications technology, security and software developed by the giants in technology.

One example is Equipment Insight from GE Intelligent Platforms. Equipment Insight is an Industrial Internet solution for data collection, analysis, and management of distributed OEM fleets. Powered by GE's Proficy software and PACSystems RXi IPCs, it enables OEMs to securely collect and analyze machine data from intelligent devices in the field, and relay key information to their employees and end users.

"GE is primarily a major asset OEM," Pavlosky says when asked how the company came to develop Equipment Insight. "A large percentage of our operating profit comes from servicing our assets, and we protect that by investing in technology that makes us capable of delivering that service in a differentiated way and at a reduced cost. What we've done with Equipment Insight is this: We've taken those technology investments from around the company and turned them out to the market so anyone from a small company to a major OEM can take advantage of the investment we've made."

Because of advancements such as those made by GE and others, OEMs can now leverage capabilities that are the result of millions of dollars in development. These benefits include:

- Improved customer satisfaction and loyalty through improved uptime;
- Transformation from a break/fix service model to predictive solutions;
- Improved efficiency of OEMs' service and support teams;
- Improved intelligence on product usage and performance for more cost-effective and streamlined R&D; and
- New revenue streams from service contracts, support and consulting.

Challenges of remote monitoring

Discussion around the challenges of integrating remote monitoring frequently revolve around questions of data security, and any OEMs considering integrating third-party remote monitoring owe it to themselves and their customers to ensure the most advanced security equipment and protocols are in place. One key question to consider: Is the monitoring vendor using the same security standards they are offering you and your customers?

GE's Pavlosky says Equipment Insight was one of the first cloud-hosted, customer-facing applications in GE.

"We had a personal onus to make sure that our team wasn't going to put something out there that had security risks or scale-ability problems," Pavlosky says. "Since we're using this technology on our own assets, we need to make sure that it's secure, that it works and that it's scale-able. Security is obviously a big deal for us, because without it the usefulness and the trust factor go away."

For for many OEMs, particularly small and mid-sized machine builders, the main challenge isn't security; it's often an OEM's own perception of its capabilities and business structure.

Out-of-the-box remote monitoring solutions remove development challenges and simplify integration. But to succeed, OEMs need to adjust from building and servicing machines to selling and delivering a service. In many cases, this requires some internal restructuring: Someone needs to sell the service; someone needs to monitor the data; someone needs to engage customers when a problem is predicted.

Many OEMs also need help communicating the value of remote monitoring to their customers. Pavlosky says Equipment Insight customers receive training and consulting designed to get them up and running in a couple of days and realize value in less than one week.

"OEMs get it," Pavlosky says. "What we have to do is enable them to convince their end user that their data will be secure; so we've spent a lot of time developing tools like white papers and data sheets that our OEMs can use with their customers to convince them that their data will be secure as it travels through the network as well as once it's hosted in the cloud."

Pavlosky says OEM customers even have access to GE staff lawyers who can consult with the OEMs' legal counsel to help draft Terms of Service contracts with their customers.

"We can't give them legal advice or write their legal documents for them, but we can consult with them and provide them with source material," Pavlosky says. "OEMs are reaping the benefits of the work we have already done."

The time is now

It is a unique moment in history when OEMs can directly leverage the investment that companies like GE have made in developing the security and effectiveness of remote monitoring technology. Because OEMs can "stand on the shoulders of giants," they can adapt quickly to their customers' needs, fast track deployment and realize new channels for revenue and product development. The primary attributes required to succeed are flexibility and the desire to win in a rapidly changing manufacturing environment.

"The key thing for OEMs to understand is that a large percentage of their operating profit can come from servicing their assets," Pavlosky says. "It's really a matter of recognizing that the value is there for the taking and that the time to act is now. If [OEMs] wait two years, they're going to be two years behind along this curve. This is coming. The bigger companies are making these investments and so what we're trying to do is to make the technology accessible down to the smallest company to enable them to improve their service business and start driving business value tomorrow." cd

Steve Diogo is Digital Content Director for Control Design and Control.

ADDITIONAL RESOURCES

Access white papers, videos, data sheets and other tools at http://bit.ly/1yrZsrm

Collect data from remote machines.

Solve customer problems before they occur.

Increase revenue through ongoing services.

Insight After Install

Realize Immediate Value Beyond the Sale with GE's Equipment Insight Solution

Today's OEMs are expected to deliver more than machines—and now they can, with the Equipment Insight solution from GE Predictivity™. The Equipment Insight solution is a controller-agnostic remote monitoring and diagnostics solution enabling OEMs to deliver a lifetime of machine data, detailed insight and predictive maintenance programs that generate revenue beyond the initial sale. As a subscription-based service, the solution has no upfront cost and **begins delivering value in just two days**. It's one of the many ways GE Intelligent Platforms is helping the world run better.

Discover how GE's Equipment Insight can help your operations at geautomation.com/insight-after-install

Remote Monitoring Sees Rapid Acceptance Among End Users

If you're not helping solve your customers' challenges, you might get left behind

By Dan Hebert

New automation industry technologies seem to have a consistent path from inception to adoption. First, suppliers and research organizations tout the technology as a game-changer, a paradigm shift, a must-have — pick your cliché. Media outlets such as this one write about the new technology, but we are skeptical, as are prospective customers.

If some potential users and/or system integrators see possible competitive advantage, then these early adopters will try out the technology to find out if the benefits outweigh the costs. Simultaneously, suppliers fight it out to establish their proprietary technology as the standard. If end users determine the technology delivers promised benefits and required rates of return with acceptable risk, and if suppliers agree on standards and interoperability, then the technology is widely adopted.

Remote access has traversed this path successfully in the process industries, proceeding from supplier promotion to widespread end-user adoption in less than 10 years. How do we know? Because a host of end users and system integrators are eager to share remote access success stories, as you'll find here.

Competitive advantage

There are many ways to skin the remote access cat. Remote access has no standards-making organization touting its capabilities. It's not proprietary, and there isn't widespread agreement on how to accomplish it, yet it's growing at a breakneck pace. When something comes along that is truly useful and beneficial, end users jump on it.

Sukup Manufacturing, based in Sheffield, Iowa, makes grain-handling equipment such as bins, dryers and conveying equipment. The company redesigned the control system on its QuadraTouch continuous-flow dryers using a PLC with Ethernet communications, says Matt Koch, electrical engineer at Sukup.

"We offer optional global system for mobile communications (GSM) functionality so that our customers can keep an eye on dryer operations from any cellphone," Koch says. "The GSM modem provides this add-on functionality. The PLC is already set up to connect to the modem, so all we have to do is simply plug the modem into the serial port of the PLC and activate service onto a SIM card to realize instant GSM functionality."

Remote access and other automation helped McCall Farms, a manufacturer of Southern-style foods in Effingham, S.C., to triple in size over the past five years to more than 250+ million pounds of produce per year.

Jeff Crisp, maintenance manager at McCall Farms, uses a wide range of PC-based remote access technologies that enable him to access process equipment remotely from different plant buildings, from his phone and from home, if there's an urgent need to do so. "I can securely and easily dial into plant systems from my house in order to troubleshoot," he says. "Using our PC-based control systems, I can watch any process in the plant run from my office."

Access from home is via a virtual network computing (VNC) server. "If something must be fixed in the middle of the night," Crisp explains, "this is a very attractive option."

There is no overwhelmingly popular method for remote access — process automation professionals are using software technologies such as phone dialing systems, cellphone

messaging systems, virtual private networks (VPNs), VNC and various PC-based software programs that allow remote users to view and even control PCs at the local site.

Remote access fuels success

It seems everybody in the process industry is using remote access in one way or another, for a variety of purposes ranging from equipment diagnostics to optimizing control systems.

Nor Cal Controls ES, a system integrator in Placerville, Calif., used remote access to solve a similar problem with unfamiliar software. "Recently, we were in the process of providing balance-of-plant tuning for AEP at one of its new power plants," says Bob Lopez, control engineer at Nor Cal. "We purchased ControlSoft's PID tuning software, but because of our unfamiliarity with the software and the GE ICS PID controllers, our process models were generating tuning values that were completely off in magnitude."

Lopez was connected with a ControlSoft process engineer, who assisted them using TeamViewer software. "He was able to access the control system remotely and participate in the bump tests and process model evaluations," Lopez explains. "This allowed him to identify and correct our PID scaling factors, which had been the cause of our initial invalid numbers."

Saving time and travel expenses is a major benefit of remote access. For Nor Cal Controls, it meant the company didn't have to wait for an expert from ControlSoft to travel to the site.

Glenn Givens, principal at Givens Control Engineering, a system integrator in Burlington, Ontario, says he used remote access to avoid traveling to "a location where my personal safety could not be guaranteed," as he puts it. "Using a VNC connection, we quickly discovered a major roadblock that halted the project for months. Had I traveled there, I would have found out after one day that there was no point in staying, and the travel costs would have been extremely wasteful."

And when there is a problem with the control system, remote access allows the vendor to help out. "At another customer site, we called the DCS vendor for assistance, and they logged in via VNC to find and correct the problem," Givens says. "The person with whom we communicated logs in to customer sites all day, full-time in his technical support role."

Global system integrator Maverick Technologies, headquartered in Columbia, Ill., leverages remote access to service clients and ease internal work. "In addition to the more mature areas like wireless tank gauging, SCADA and other remote concepts, we've made heavy use of the PC's remote access capabilities on newer control systems," says Chad Harper, Maverick's director of technology. "Internally, we utilize remote access to our internal development PLCs and DCSs, which allows for expanded capabilities in training and project support. We have several clients where we perform project and maintenance work directly in their control system through dedicated PC-to-PC connections. We also provide network monitoring services for clients who have too many remote facilities to support adequately in person."

Meanwhile, Malisko Engineering, a system integrator in St. Louis, has used remote access for 10 years, so it's in a good position to summarize its advantages. "Remote access to industrial automation systems has proven to be an extremely cost-effective component of a plant's support system," says Dan Malyszko, senior systems engineer. "Getting a process line back up and running in minutes rather than hours by giving technical support resources via remote access can help a plant avoid thousands of dollars of downtime. Another benefit is reduced costs when making control system programming changes. Depending on the nature of the programming change request, travel costs can be eliminated entirely when performing the work via remote access." cd

Dan Hebert is Senior Technical Editor Control Design and Control. This article originally appeared on ControlDesign.com.

Make More; Travel Less

Remote monitoring, diagnostics and control tools enable machine builders and integrators to skip the travel, but offer more services

By Jim Montague

Demanding applications such as heat-treating can be complex, so furnace control systems must do more than regulate temperature. For example, a 10-bar, quench-furnace system provided by Ipsen, Rockford, Ill., also must control speed, pressure, flow direction and other variables throughout the quenching process because they directly affect load distortion in die-casting operations. These parameters change from product to product, so furnace controls need to allow users to develop and test batch recipes too.

Users of Ipsen's industrial vacuum and atmosphere furnaces use its CompuVac control system to look into their thermal-processing applications in the aerospace, commercial heat treating, medical, energy and automotive fields. However, users still need more help.

"Local controls provide a window into the furnace's process with standard features, including an integrated touchscreen for monitoring workloads, displays for programming, running, real-time and historical monitoring, almost unlimited recipe creation, modification and storage, and alarm displays, batch reports, quality control audits and record archiving," says Larry Moore, electrical and software engineering manager at Ipsen. The company designs and builds industrial vacuum furnaces, atmosphere furnaces and supervisory control systems, while its aftermarket support team helps users around the world solve problems, plan furnace controls upgrades, replace hot zones and secure parts, maintenance and field services.

"Though CompuVac makes it easy to create and run custom heat-treating profiles and batches, users often have questions or need support from our engineers," Moore explains. "Ipsen's aftermarket support team is prepared to offer technical advice and help diagnose problems, and remote access to both control systems helps our technical personnel see what the system is doing. In the past, we relied on an Ethernet modem, which required an analog phone connection at both the customer and Ipsen's locations. Phone modems are notoriously slow, and in some cases, providing the analog phone connection at the customer site proved difficult or impossible. We clearly needed a better remote access solution."

Saving miles and time

Luckily, the expansion, diversification and growing sophistication of remote machine support makes it more practical for builders, integrators and other service professionals to access users' equipment and production lines from a distance, and then monitor, maintain, troubleshoot, repair and upgrade them without being physically onsite. Instead of dealing with clunky, old-style, dial-in modems, or even jumping through hoops to get permission to access users' internal virtual private networks (VPNs) or other networks, the latest remote-access components let outside experts work on safe versions of a machine's operating software and data, which are served up to cloud-based services that don't require users and their IT departments to allow access to their internal networks.

"We encourage customers to install ports into their systems to allow remote access for monitoring and trouble-

IPSEN INC. AND PHOENIX CONTACT

Figure 1: Ipsen supports its vacuum furnaces with VPN routers over the Internet, which allow data in a user's CompuVac furnace control system and other devices on the local control network to be accessed remotely.

ASSISTANCE AT A DISTANCE

shooting," says Jon Ertle, vice president of sales at Criterion Manufacturing Solutions in Comstock Park, Mich. The company manufactures CNC routers and CMM-style gauging machines and delivers custom production, automation and gauging equipment. "In the beginning, the best way was to dial in," Ertle continued. "Later, due to security concerns with the Internet and early VPNs, we usually phoned ahead to request access, but it could take days or a week for some IT departments to grant it. Most recently, we've been able to use VPN routers, which plug onto our customer's machine, establish a secure, SSL-based VPN tunnel, and can call our headquarters when they have a problem."

This gives Criterion a safe, remote link to the PLCs and HMIs on its users' machines. "We can also monitor and manage serial connections to program barcode readers and other devices, or we can integrate cameras or other peripheral equipment," Ertle adds. "Using these new VPN routers saves our customers and us a lot of time. Many times, users contact us with a problem that's actually a symptom or the result of another problem, but now we can look at their HMIs and PLCs for the underlying situation and solution."

The right router

Though they're relatively new in remote machine monitoring, VPN routers are being deployed to remotely monitor and control all kinds of machines and other equipment because they're easier to set up, more secure and less intrusive than other monitoring methods.

For instance, to achieve secure remote access to its furnace controls installed worldwide, Ipsen's VPN routers allows the company to connect to a customer's industrial network via the Internet with little intervention from its IT department, while secure communication is provided by the VPN and a stateful packet inspection (SPI) firewall.

"The router's wide-area network (WAN) port typically connects to the customer's company network, which gives it access to the Internet through the corporate firewall/router. But because it tunnels outbound — that is, back to Ipsen — no ports need to be opened on the inbound side of the customer's network. This satisfies the customer's IT department security requirements because outsiders can't detect a port," Moore explains. "Conversely, the router can be connected directly to the Internet via its WAN port if a customer doesn't want any connection to its corporate network."

Once its initial connection is made, the VPN router allows Ipsen's engineers to view system data in real time and download program changes when needed. The router can be installed in the furnace's control panel via a DIN-rail module, a PCI card or as a portable device that plugs into a USB port, depending on the customer's requirements. Typically, there is a router at each end of the tunnel. Ipsen installs one per furnace, but only one receiving router is needed at Ipsen's home base to accommodate up to 250 simultaneous VPN connections.

"The network is configured in such a way that our service technicians can access each customer's VPN from laptops," Moore says. "A technician can see all the customer furnaces that are tunneled back to the mGuard at Ipsen in a hub-and-spoke topology. Once connected, the router lets our engineers access data from any Ethernet-connected device on the furnace's local network, including PLC, HMI, DAQ instruments and video recorders. The router's own configuration can also be accessed remotely through the VPN connection."

As a result, the VPN router can be used for start-up support, maintenance support or customer-requested enhancements. And, though these installations on equipment are relatively new, Ipsen already has performed many remote control modifications and diagnostics that previously would have required an on-site service technician.

"Saving the cost of one service trip under warranty is enough to pay for the cost of a system," Moore adds. "Remote access is a mature technology, but past iterations often lacked performance, cost-effectiveness and security. Our VPN remote access system overcomes these challenges and provides safe, secure, high-speed and low-cost access to users' equipment worldwide from one router located at our headquarters."

Standards aid oversight

To help improve machine monitoring, some builders have pursued standards to help streamline communications with their devices — and between them. While many builders still use basic TCP/IP and other Ethernet varieties such as Profinet, EtherNet/IP and EtherCat to enable machine connections and ties to upper levels, some interoperability problems persist. As a result, several developers launched the MTConnect open, factory-floor communication protocol, which was initially used for machine monitoring, status reporting and other details, but is growing to include alerts and alarms, temperature, speed and other information.

"There are basically three ways to get information from a machine," says Dave Edstrom, president and board chair of the MTConnect Institute. "The first is native support for a standard, such as MTConnect, which is basically plug-and-play. The second way is to use a device that doesn't speak a standard protocol, but does have an adapter that translates from the proprietary protocol to a common format, for example, using an MTConnect adapter to speak to a Fanuc controller via its standard Focas protocol. The third way is to use a machine that can't provide information through a software interface, so the only way to get information is by intercepting electrical signals. One advantage of MTConnect is there are lots of options for using it with legacy equipment."

For example, Okuma in Nagoya, Japan, and its U.S. subsidiary, Okuma America, in Charlotte, N.C., stopped counting when its users reached more than 200 machines with MTConnect for shop-floor monitoring of its legacy and current, open-architecture Thinc-OSP controls, according to Brian Sides, Okuma's technology director.

"One notable installation occurred recently in Europe, where our customer wanted to connect its new Okuma machines to its existing Freedom eLog shop-floor monitoring system," Sides says. "Using our MTConnect agent, we were able to provide the customer with the necessary plug-and-play connectivity to allow them to monitor the productivity of these new installations from their U.S. headquarters." Freedom eLog comes from 5ME, which is a new business launched in July that includes the tooling and services, cryogenics and software business units of the former MAG IAS.

Security and documentation

Of course, despite the ability of VPN routers and other networking components to segregate network traffic and conduct secure tunneling, many users remain concerned that remote monitoring will expose them to intrusions and possible attacks. To allay these fears, most suppliers give users physical keys and switches, so they can enable their VPN routers only when remote monitoring and support is

needed, and disable them when the problem is resolved.

Once a secure VPN router connection or other external link is established, another primary way that remote monitoring and control can become more approachable and workable for many users is by sending applicable operating information to a third-party location, such as a cloud-based service. This strategy gives remote engineers and technicians the data they need to support the equipment, but doesn't compromise the user's internal network security.Besides accessing operating data and conditions, remote monitoring and control increasingly means collecting and relaying real-time video and other specialized data streams.

For example, Germany-based groninger GmbH and its subsidiary, groninger USA LLC in Charlotte, N.C., design and build fill-and-finish processing lines for pharmaceutical and cosmetics manufacturers. Since the firm was formed in 1980, they've installed more than 3,000 machines, including more than 500 in North America.

To help reduce its considerable travel and phone time, groninger developed its Remote Video Service, which it offers as an option on new machines or as an upgrade to existing, Ethernet-enabled equipment. The service begins with a secure, key-switch-enabled, customer-initiated VPN connection between a user's machine at its facility and groninger's secure, internal service network in the U.S. and Germany.

Most onsite machine networks include the usual PLCs, HMIs, servo controllers and other Ethernet-enabled devices, which groninger's service engineers can access to see live program statuses, make any needed changes, backup or restore programs, create new recipes and deliver machine or software updates or revisions. Once a problem is resolved or the machine's PLC or program is updated, the users can switch off their VPN key to disconnect their machine network from groninger's service network.

However, groninger's service also lets users connect a remote-controlled video camera to their same machine network (Figure 2). So besides viewing live PLC and I/O displays, groninger's engineers also see the machine from an operator's perspective by panning, tilting and zooming in the camera to examine particular areas. For easy camera setup, groninger uses a Power-over-Ethernet (PoE) module to supply its remote cameras with power and data over one cable.

GRONINGER AND PHOENIX CONTACT

VIEW TO A FILL

Figure 2: An operator interface and other crucial points on groninger's fill-and-finish processing lines at its customers' plants can be viewed at the machine builder's home office via remotely controlled video cameras.

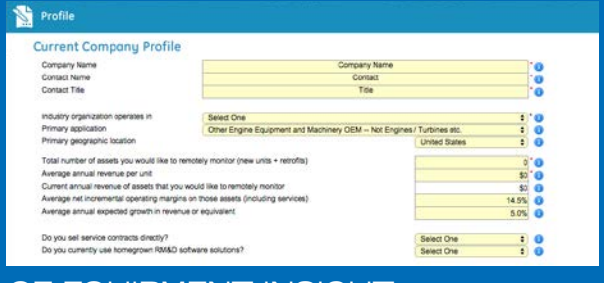
The company also developed remote monitoring and control over wireless networks, which is a setup option in its Remote Video Service. This method employs one router, one key switch and one wireless access point at each production floor. As a result, each groninger machine with the wireless option has an antenna installed that allows it to connect to the wireless access point. The firm reports that wireless is especially effective for many of its cosmetics customers, who must reconfigure their production lines regularly to accommodate changes in packaging size, shape and types. cd

Jim Montague is Executive Editor of Control and Control Design. This article originally appeared in the November 2013 issue of Control Design magazine.

Remote Support To-Do List

Every application has its own unique characteristics and requirements, but there are some common requirements, methods and tools that machine builders, integrators and others can use to establish remote support, monitoring, troubleshooting and even control.

- Reexamine end users' business performance goals; evaluate machines, production lines and other equipment for achieving them; and evaluate how and where report monitoring and support could help.
- Analyze existing network infrastructure, including ports, other physical and wireless connections, communication protocols, hardware components and software used.
- Determine if network upgrade from dial-up modems to VPN and IP-based communications would improve remote support to end user and establish permissions and policies for granting access.
- Coordinate deployment of remote monitoring components with existing machines and equipment, especially to make sure remote support devices don't affect production operations.
- Implement appropriate level of security functions in remote support devices and networks, including secure IP and VPN links, configurable firewalls, packet inspections and dynamic data filtering.



GE EQUIPMENT INSIGHT BUSINESS VALUE TOOL

This tool was developed to help decision makers analyze outcomes and assess the potential benefits/payback of implementing this GE Predictivity™ solution. Click here to launch this helpful tool, http://bit.ly/1J0RIwl

TempuTech Installs GE's Equipment Insight Solution And Realizes New Revenue Streams

The OEM

TempuTech, based in Memphis, Tenn., is an OEM provider of grain management systems. The company manufactures custom built cables and sensors that monitor grain temperature and provides turnkey, scalable hardware and software solutions to small and large farms.

The Challenge

To help farmers and grain management companies protect their investments, TempuTech has developed two main software offerings—a temperature monitoring system and a hazard monitoring system. The company's temperature monitoring system sends standardized temperature reports to customers daily so they can reduce the grain temperature as needed to protect grain from hot spots due to infestation and germination that can cause the product to combust. The company's hazard monitoring systems pinpoint problems in grain conveyor systems such as belt misalignment and slippage, speed variation, and overheated bearings.

TempuTech teamed with GE Intelligent Platforms to integrate the systems and offer real-time, proactive alarming, automatic back-up and redundancy features, mobile capability, customizable reports, and in-depth data on alarms.

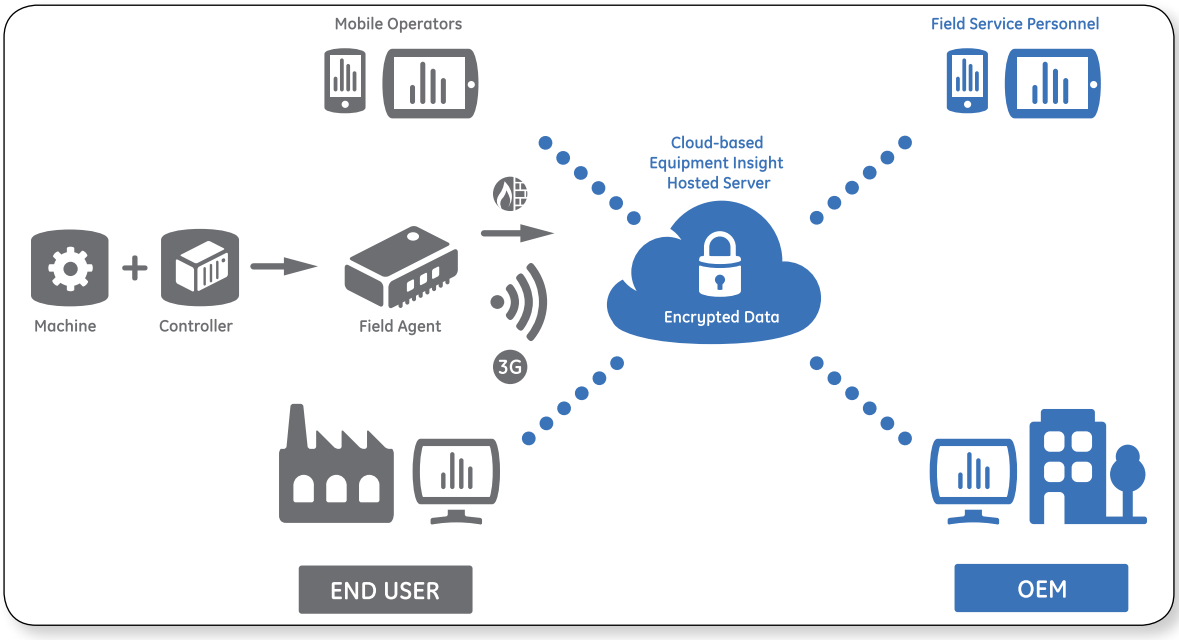
The Solution

The Equipment Insight Solution, from GE Predictivity™, gathers and analyzes temperature and hazard data from TempuTech customers and activates alarms in response to specific incidents and conditions helping TempuTech proactively notify their customers. TempuTech can now dispatch the nearest technician to the customer with the right parts and tools in-hand improving utilization of their field services resources. As a pilot, TempuTech installed a GE Equipment Insight solution to run the hazard monitoring system at a large grain manufacturer.

Equipment Insight is an Industrial Internet solution for data collection, analysis, and management of distributed OEM fleets. Powered by GE's Proficy software and rugged PACSystems RXi IPCs, it enables OEMs to securely collect and analyze machine data from intelligent devices in the field, and relay key information to their employees and end users.

The GE system allows onsite viewing, virtual monitoring via a secure cloud environment from mobile devices or browsers, and control of grain transfer operations across the facility. In addition to the local HMI hardwired screens, the virtual monitoring is provided via a dedicated, secure cloud-based environment, combining the redundancy and security of a physical connection with the convenience of the cloud. TempuTech anticipates that the Equipment Insight solution will improve its customer's asset performance, reduce unplanned downtime, and improve decision-making effectiveness.

Data is now available in real-time in a private cloud-based environment provided by TempuTech for its customer and accessible via a custom URL anywhere, anytime, on any device. TempuTech plans to install a temperature monitoring system at at one of the customer's other facilities to remotely monitor the plant's 5,000 temperature sensors.



HOW IT WORKS

The Results

TempuTech is transforming its business model from a "break/fix" maintenance provider to a proactive partner, helping to eliminate downtime and increasing productivity for its customers. In addition, TempuTech's pilot customer expects to improve its asset performance, reduce unplanned downtime, and improve decision-making effectiveness.

Next step: TempuTech will offer a system that controls all aspects of a grain storage facility, combining different applications, devices, sensors, databases, and systems into one mobile-accessible system that can start, monitor, and stop key processes and create preventative maintenance reports.

The GE Equipment Insight solution positions TempuTech customers to seamlessly connect their machines, data, insights, and people. With the Equipment Insight solution, TempuTech, their customers and the entire grain management industry can leverage the Industrial Internet.

This Case Study was produced by GE Intelligent Platforms, the sponsor of this E-Book.

GE Intelligent Platforms

CONTACT INFORMATION

Americas: 1 800 433 2682 or 1 434 978 5100

For more information, www.geautomation.com.