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Tales from the Tech Trenches

Two food processors shared their experiences with wireless networks, cloud computing and information management at the recent Smart Industry 2015 conference.

BY KEVIN T. HIGGINS, MANAGING EDITOR

Social unrest, not plant automation, was on Stephen Stills' mind when he sang, "Something's happening here, what it is ain't exactly clear." For what it's worth, the sentiment also applies to manufacturing technology.

Industry 4.0, the Internet of Things (IoT) and related phrases are moored in marketing speak, but they nibble at real changes occurring in how data is gathered and information shared in industrial production. Some meat was hung on those marketing bones at Smart Industry 2015, a conference organized by Putman Media and presented in October in Chicago.

Wireless networks, cloud computing and analysis of huge volumes of data are part of IoT in process industries, explained keynoter Peter Zornio, chief strategic officer at Emerson Process Management (www2.emersonprocess.com), Houston. Applications in food & beverage manufacturing are few and far between, in part because of higher standards for field devices and other hardware. "You're not going to find a $2 sensor that is safe, has the hygienic requirements you need for food & beverage and is going to last 30 years," Zornio observed, adding, "The process industries are very conservative" and slow to adopt "disruptive technology."

"We've used Emerson's mesh seven years," scoffs Ed Rodden, chief information officer at Sugar Creek Packing Co. (sugarcreek.com), Washington Court House, Ohio. Rodden was one of two food processing professionals who described how wireless networks and interconnected field devices are impacting their operations.

The other was Jon Riechert, senior engineer-innovation at Tyson Foods Inc.'s Hillshire Brands division in Downers Grove, Ill. (www.tyson.com). Riechert was part of a panel discussion that tried to place theoretical benefits in the context of real-world examples on the conference's first day.

Chubs R Us

Four years ago, Hillshire began addressing the data visibility challenge in weight control on lines producing 1-lb. chubs of Jimmy Dean breakfast sausage. Working
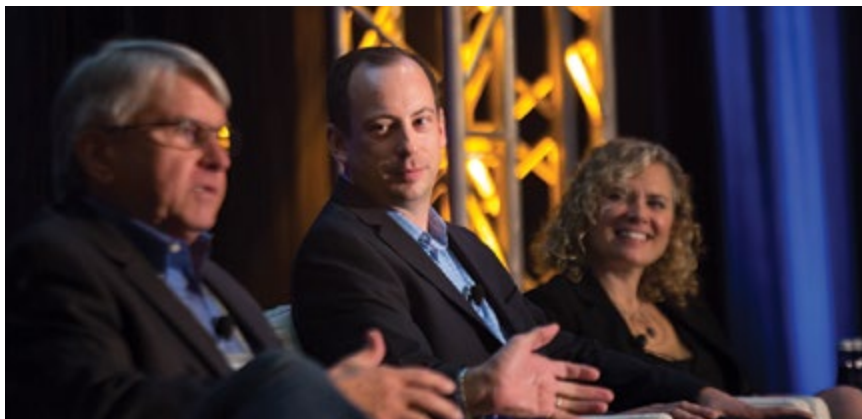
Tyson Foods' Jon Riechert (center) listens as fellow panelist Rory Smith explains how Internet communications is improving elevator uptime globally for ThyssenKrupp. On the right is Beth Parkinson, a connected enterprise expert at Rockwell Automation. Photo: Tori Soper Photography

with systems integrator Grantek, Hillshire installed Rockwell Automation's FactoryTalk Historian and VantagePoint software at its Newbern, Tenn., facility. The plant produces 150 million lbs. of sausage a year, and the new system was designed to give corporate and plant engineers visibility to shop-floor operational data.

Food safety was the rationalization for undertaking the project. A sausage cook plant was forced to shut down because cook temperatures couldn't be validated. Avoiding recalls involving Jimmy Dean sausage — a billion-dollar brand and Hillshire's top seller — is critical, yet engineers lacked visibility to the functioning of drive belts and steam belts that determine time and temperature. "That process was out of control, and we couldn't see it," Riechert recalls. Those variables are among the 2,400 data points the data system collects.

Avoiding recalls protects a brand but doesn't boost the bottom line. A 0.1 percent reduction in sausage giveaway would deliver an ROI on the project, and that target was reached in three months. (Network-wide, Hillshire processes 2 billion lbs. of meat annually.) Since then, deviation from set point has been reduced 0.5 percent.

"We get whatever data we can collect, but it has to be automatically measurable," Riechert cautions. Meat temperature affects fill rates, and temperature sensors collect that information and enable adjustments in fill rates. Fat/lean ratio also has an impact, but that information cannot be automatically monitored. Until sensor technology is able to deliver it, some giveaway is inevitable.

Encouraged by the chub results, Hillshire added mobility to plant visibility two years ago. Beginning with its State Fair Foods corn dog facility in Haltom City, Texas, corporate engineers and on-site production managers began using Microsoft Surface Pro devices that could access dashboard data residing on a web page. OEE, downtime and other machine data from the 12 fryers and 15 packaging lines gave on-site personnel and individuals working remotely new visibility to problem areas.

The biggest challenge, according to Riechert, was winning IT support for giving off-the-shelf devices access to a protected network. The continuing tension between

operations and IT was a sub-theme throughout the speaker presentations, underscoring security concerns in the so-called connected enterprise.

"Once you put your devices on the Internet, you become an Internet security company," allows Kevin Miller, principal program manager for Microsoft's Azure IoT, a cloud-based hub capable of supporting up to 10 million connected devices. Azure is supported by eight U.S. and 13 foreign data centers, Miller says.

The wireless plant

Wireless networks are used extensively at Sugar Creek's new facility in Cambridge City, Ind., a brownfield site that was expanded to 418,000 sq. ft. and is home to the copacker's foray into high-volume sous vide production. When fully operational, the plant is expected to generate $350 million in annual revenue, Rodden says. Sugar Creek began the year with four production sites and should end the year with $600 million in sales.

Sugar Creek's IoT infrastructure is built on analytics solutions from Cisco Systems Inc. (www.cisco.com). Cisco's RJ Mahadev joined Rodden in his Smart Industry presentation.

Pork bellies are a key raw material in Sugar Creek's operations. Several years ago, the company introduced a pork belly procurement system based on RFID tags affixed to the 700-1,100 carriers in its facilities that transport each belly through the production process. Cook temperature, smokehouse dwell time and other variables affecting product shrink are captured by sensors and transmitted via the RFID tags to a data historian.

That experience created a comfort zone for the more ambitious infrastructure installed in Cambridge City, though increased productivity remains the goal. Project planning began a year in advance of the facility's July opening and will be completed in about a year.

"Pushing responsibility for success in the process to the lowest level" is the avenue for reaching the productivity goal, Rodden says. Raw materials constitute 70 percent of production cost, and a one-point increase in yield would more than offset the $6 million capital cost for the IoT project.

A video surveillance system is a big chunk of the price tag. The plant has 254 cameras protected by stainless-steel enclosures, adding literal meaning to the term plant visibility. To illustrate how cameras and wireless communication enhance visibility, Rodden offers a hypothetical plant visit by a key customer.

Prior to the visit, the sales rep contacts a plant supervisor via Jabber, an instant messaging platform with voice, video, desktop sharing and conferencing capabilities. When that median fails to connect the two, the rep uses IC instant connect, which simplifies radio connections to the plant floor, where the supervisor is working. Using a WebEx collaboration tool, the supervisor takes the rep on a video tour of the production areas the customer will see.

Ed Rodden, Sugar Creek Packing's chief information officer, fields a question from a listener to his factory of the future presentation. Photo: Tori Soper Photography

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Close to 200 manufacturers, technology providers and other professionals attended Smart Industry 2015. Photo: Tori Soper Photography

The plant manager greets the rep and customer when they arrive and gives them temporary security badges, which are implanted with a real time locating system (RTLS) that will track their movements during the visit. The customer requests process data from production systems, triggering an iPad request from the plant manager to IT to populate the data in an isolated server. Before leaving, the customer receives an e-mail with instructions on how to access the data.

Tracking visitors' movements would constitute a poor ROI on a $6 million investment, Rodden concedes, but his example highlighted the IT/OT (information technology/operational technology) convergence and plant connectivity the installation was designed to provide.

Plant refrigeration is delivered through 80,000 lbs. of ammonia, and if sensors detect a leak, a network sensor would determine wind direction and the location of all personnel before broadcasting an evacuation notice and the best exit route to radios, phones and other devices.

"We're all worried about security," Cisco's Mahadev points out, "but we never have a budget to deal with it. Think of securing the plant and information for the sake of operations," including secure access by customers to data and by vendors to the programs they have installed.

Wireless networks are "the industrial equivalent of Google Plus," Mahadev adds, but he recommends an outcomes-based approach to implementation. "What hurts enough to spend money?" he asked. "If you're not clear about what you need, IoT vendors will sell you things you don't really want to buy."

A recent SCM World/Cisco survey concludes that manufacturers who have embraced IoT have cut unplanned downtime 5.8 percent from 11 percent and product defects to 2.5 percent from 4.9 percent. **ⓕⓟ**

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Walk Through This Very Wired Plant

As SugarCreek renovates a food plant, Cisco wires it for the industrial internet of things

BY DAVE FUSARO,
EDITOR IN CHIEF

SugarCreek is a 49-year-old processor of bacon, meatballs, sausage patties and chicken for both foodservice and retail. It's just finishing up a gut-rehab of a brownfield plant, a 70,000-sq.-ft. facility acquired from a bankrupt food processor in Cambridge City, Ind., which has been expanded to 418,000 sq. ft. While the new equipment, floors and walls are apparent, less obvious is the considerable investment in technology.

As a result, one of the key architects is SugarCreek's chief information officer. Ed Rodden quickly points out he has spent as much time on the business side as on IT, and that he's no "IT guy."

He does, however, see the huge potential of data gathering and analysis at many more points than are taken advantage of by most companies. And he sees the new Indiana facility as a blank canvas on which to paint his vision of a futuristic food plant, one that uses that catchy phrase "industrial internet of things" (IIoT) to tie together the galaxy of sensors and other devices that make up many modern plants.

"To us, IIoT means the ability to use all the available pieces of data, including video and security, from all kinds of devices and to tie them all together in such a way that's useful to the business," he says.

Sugar Creek already was a Cisco customer before the processor embarked on the Cambridge City project. Before he started on the rehab, Rodden made a visit to Cisco's San Jose, Calif., headquarters, which opened his eyes to the potential breadth of tying all this data together in automated, immediate and actionable ways.

SugarCreek officials and IoT architects from Cisco Services analyzed the Sugar-Creek use cases and brainstormed technical solutions that would address the needs. The companies conducted technical proofs of concept and validated the ROI of the proposed platforms prior to deploying them. Cisco Services was responsible for program-managing the technology deployment at the factory.

Rodden and R.J. Mahadev, Cisco's IoT Service Solutions lead, will semi-literally "walk" attendees through a plant visit that contains some surprises in a presenta-

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tion at the Smart Industry Conference & Expo Oct. 5-7 in Chicago (see www.smartindustry.com). By the way, all the parenthetical references (CXS Architecture, IC, VSOM, etc.) refer to Cisco products; they're explained in the web version of this story (www.foodprocessing.com/articles/2015/case-history-sugarcreek-wired-plant/?show=all)

The night before

Their "plant tour scenario" starts the evening before a customer is scheduled to visit the facility. The plant manager receives a call at home from the second shift superintendent to explain an issue that arose at the plant.

To better explain, the superintendent opens a Webex session with the plant manager and shares video being captured (via CXS Architecture, Librestream) of the issue on the plant floor. "This allows the plant manager to fully understand the issue and give appropriate responses," Rodden explains.

That same evening, the salesperson who's bringing in the customer attempts to make contact with a night supervisor on a Jabber session from home to verify that all of the preparations are complete and the plant is ready. Getting no response, the salesperson calls the night supervisor on his radio (IC) and reaches him on the plant floor.

The supervisor grabs a VDI mobile device with video capability from the plant QA office, signs in, establishes a Jabber session with the salesperson and promotes the Jabber session to a Webex, taking the salesperson on a "walking tour" showing him that preparations are complete and everything is ready.

When they end the session, the salesperson schedules a greeting to be displayed in the lobby at the appropriate time using Digital Signage.

The morning of the visit

The plant manager has alerted security at the gate that a customer and salesperson will be arriving. He also sets up an event notice with physical security to send him a notification when the salesperson's badge is read at the gate.

Upon their arrival at the gate, the salesperson checks in with the guard, who assigns a guest badge as an "in" swipe. That creates a guest account and prints a sticker with the login info to be attached to the badge.

The salesperson uses his card to open the gate, which triggers an email notification to the plant manager that they have arrived. This also triggers video surveillance to begin tracking the identity card of the salesperson (VSOM). Any time his card is read in an area, the surveillance footage is tagged allowing the plant manager to visually see where his visitors are.

The company's chairman decides to join the visit and arrives at the gate using his key card to enter. Once his presence is recognized, content from various media

A Cisco VSOM camera is mounted inside a MOOG housing. Stainless steel enclosures are required because of cleaning requirements for food safety.

outlets he monitors is spun up to displays surrounding his desk and his local devices (ECDS). A notification is sent to the admin group at the plant notifying them that the chairman has arrived.

As the salesperson enters the lobby with his customer, the plant manager greets them and gets them temporary security badges, which also makes the visitors visible to RTLS. If the plant manager had been delayed, the visitors would have used a Jabber-driven kiosk to notify the admin group of their arrival.

The customer is instructed that he may connect to a visitors' wireless network. ISE presents an acceptance page to the visitor to allow basic inspection of his wireless device and access to the internet through the plant's network. He accepts, the device meets the criteria and he is now connected.

The tour begins

After properly preparing with gowns, etc., they enter the plant floor to observe the process for the product the customer is buying. The customer's temporary card allows access to only the main office area, restrooms and certain other areas (CPAM), so he must be escorted by someone with access into other areas.

The customer observes high-performance work team displays placed strategically in the work area displaying the day's numbers and key process data and indicators (Digital Signage). He also notes the use of mobile devices in IP67-rated enclosures by team members to enter data as needed without leaving the floor or having to physically go to a fixed station.

Process data from the machines and sensors are being captured through the CPwE network, integrated but isolated (ISE) with the data readily available. The customer asks about access to process data, and the plant manager demonstrates access through one of the team's mobile devices.

The plant manager sends a note to IT from his iPad requesting read-only access to the process data set for the customer. An IT developer will spin up an isolated server and create a service to populate the process data of interest to the customer (UCS) also setting up his access in the process. The customer will receive an email with instructions before he leaves the facility that day.

At this point in the tour, an alarm has indicated to the plant safety team that a pressure drop occurred in an ammonia line within the facility. The line is monitored by sensors integrated through MSE. VSOM triggers the automatic recording of video, and a predetermined amount of prior video is tagged to save.

The safety team leader determines the current direction of the prevailing wind using a network sensor (integrated through MSE) and triggers an evacuation notice broadcast to all devices (radios, phones, etc., via Informacast/IC) including that of the customer. The notice instructs them of the exit direction they should take, and directions also are displayed on monitors throughout the facility (Digital Signage.)

Cisco 3702e Access Point is used in freezer locations because of temperature restrictions.

All doors are unlocked (CPAM) and non-essential devices powered down.

The team leader evacuates with his mobile device using MSE/RTLS to monitor the evacuation. A dynamic display of rooms where motion is occurring is accessible to the team leader. As the evacuation progresses, he notices an employee who has not left his area and also notes that he has a radio assigned to him. He contacts him (IC) and learns he was powering down a device and is now leaving the area in the proper direction.

An emergency response team, properly equipped, has determined there is no leak – it was a faulty sensor. So the team notifies the safety team leader via his radio (IC), who, still outside, triggers a new broadcast notice (Informacast/IC) to all advising that the evacuation has ended and that everyone should report to their normal stations. Digital Signage provides a notice that all is clear.

The customer, salesperson and plant manager return to the office area and enter the main conference room. Lights, coffee maker and video conference device all spring to life as their presence is detected (MSE/RTLS/CPAM.)

They review the day's activities and action plan, and the customer records and files his report with his home office using his mobile device, which he has connected through ISE.

He turns in his badge as they leave the facility. The guard does an exit swipe of the badge that triggers the shutdown of all connections and privileges related to the guest badge.

The plant manager finishes his day with a quick review of energy consumption (Cisco Energy Management/CPAM). As he leaves his office, the lights go out, his stationary office devices power down and he heads for home. ⓕⓟ