IDEA BOOK

AUTOMATIONDIRECT.com

FOOD & BEVERAGE

Efficiency Overtakes Automation as Top Concern

Since 2014, respondents to Food Engineering's annual State of Food Manufacturing survey have ranked automation as the No. 1 trend affecting the industry. Until this year. While automation is still a top-two trend, it has been overtaken by efficiency/maintenance/new equipment by this year's respondents. While automation moving out of the top spot may be a mildly surprising result, it's still clear that it's a major concern for processors. In addition to being the second-most common choice for the biggest challenge, it touches most of the other top trends in one way or another.

The Top 10

1. Efficiency/maintenance/new equipment (37%)

2. Automation (30%)

3. Customer demand (17%). Changes in how consumers want their food to be packaged, prepared, sourced, delivered and available.

4. Clean label/healthy foods (16%). Clean label/healthy foods trends are a multiplier for the degree of difficulty created by changing consumer demands, because they often create additional production challenges and costs to products.

5. Decline in workers/worker availability (15%). Speak to a processor from just about any company and the conversation will soon turn to difficulties in finding labor, both skilled and unskilled.

6. Training/wage increases (11%). As a subset of finding and keeping good workers, higher wages and increased training costs are producing budgetary pain for processors.

7. Food safety/FSMA (8%). Food safety and FSMA aren't new concerns, but how they're being evaluated and enforced are.

8. Packaging (8%). Packaging is always a big expense for processors and changing consumer demand and the rise of e-commerce are affecting this area tremendously.

9. Cost-related (6%). A catch-all category that could arguably be part of any other response given.

10. Sustainability/eco-friendly (5%). As with food safety, sustainability isn't a new concern. But how it's viewed and implemented is changing.

10 (tie). Tariffs (5%). Although a relatively small number of respondents chose tariffs as their top concern, they are affecting processors in a number of ways.

Changing Consumer Demand

While changing consumer demands are regularly listed as one of the top challenges, the recent trend of clean label challenges makes for an interesting set of results in this year's survey. Respondents could choose up to two options as the trends that will be most impactful to food manufacturing over the next five years, so it can't be said that consumer demands (17%) plus clean label (16%) would exceed automation (30%) as the second-most common trend mentioned. But both of those categories being as high as they are shows that they're having a big effect on how processors are operating.

Consider one response from a respondent about changing consumer demands: "People wanting wedding cupcakes instead of traditional wedding cake."

If cupcakes are the hot item instead of cakes, that changes how the finished product is made, what ingredients are needed and the quantity required.

The Changing Cost of Products

Almost 40% of respondents say their total cost has increased, with a mean increase of 9%. Of those who say their total cost has increased, 59% say cost has increased from 1-5%, with 22% saying 6-10%, and 10% saying 11-15%.

When it comes to labor costs, 54% say it has increased compared to 2018. Of those whose labor costs have increased, 53% say 1-5%, 32% say 6-10%, and 10% say 11-15%. The mean increase is 8%.

As for material costs, 53% of respondents say they have increased, with a mean increase of 8%. More than half (55%) of those whose material costs have increased say they have increased by 1-5%, while 29% say 6-10%, and 5% say 11-15%.

Labor Issues

More than half of respondents (53%) say their workforce is the same size now compared to last year. Almost a third (31%) say that workforce has increased, while 16% say it has decreased. Among those who say their workforce increased, 85% say it has done so because of growth.

That tracks with the responses to a question about whether gross throughput would increase. Almost two-thirds (65%) of respondents say that throughput has increased, which shows that companies are growing and hiring more people to help meet increased demand.

While a large majority of respondents say their workforce has stayed the same or increased, the next question— "Is your location at full staff or understaffed?" is revealing. Forty percent of respondents say their operations are understaffed. Two-thirds of those respondents say that overtime is being used to meet production demands while understaffed, and 42% of respondents say there have been changes in shifts or production schedules. About a quarter say more processes are being automated.

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Budgets and Capital Investments

For the most part, budgets are in good shape. More than half of respondents (52%) say their budget for production, packaging and processing equipment has increased, with 30% of those saying it went up by more than 25%. Another 40% of respondents say their budget stayed the same.

Budgets for automation and control hardware and software are flatter, with 62% of respondents saying their allotment is staying the same. The top three purchases of process control hardware and software are digital sensors/transmitters, lab analysis equipment/ software, and plant control systems or upgrades, with each of those choices being mentioned by 20% of respondents.

Only 18% say they installed advanced automation systems, but that number was made up of significantly more midsize (501-5,000 employees) and large (more than 5,000 employees) companies.

Food Safety Strategies

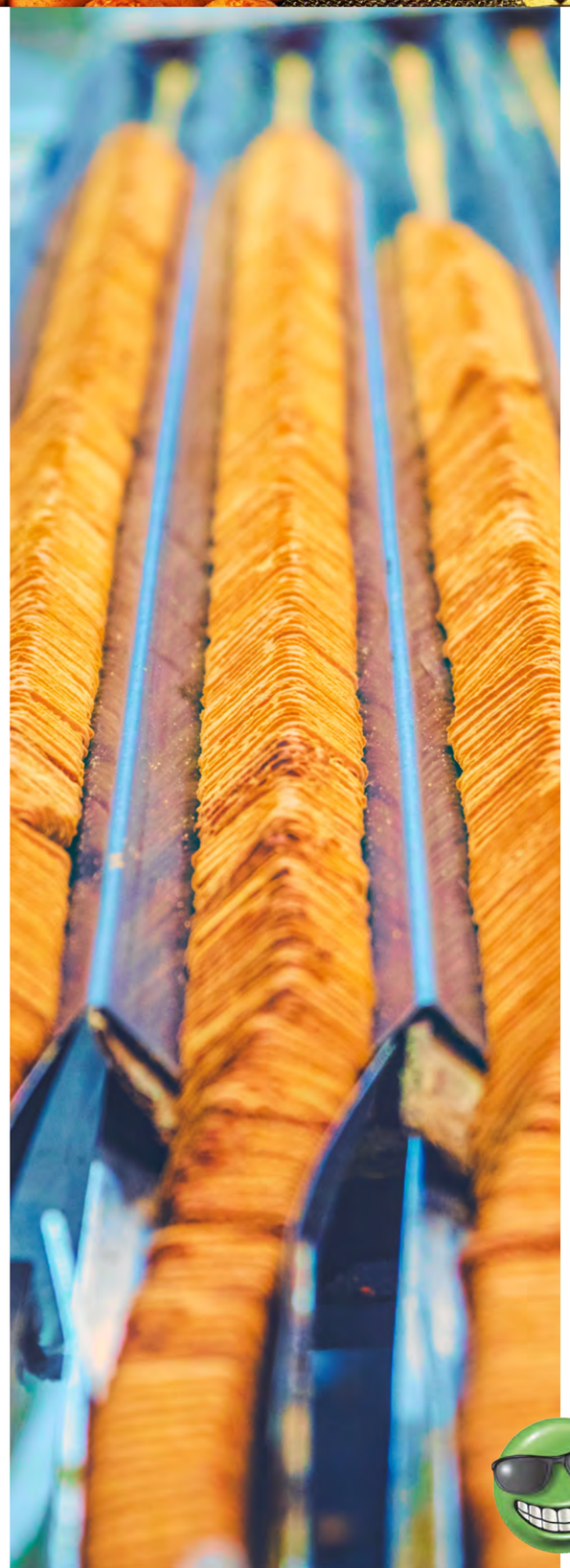
Food safety is always a top-of-mind concern for processors, and FSMA's change from an educational to an enforcement model is making it more important than ever to have food safety plans and procedures in place. Responses to which food safety methods are in use varied fairly widely, but the top five are all being used by at least two-thirds of respondents:

1. Food safety management system (75%)
2. Food allergen controls (71%)
3. Comprehensive staff training (69%)
4. Lot level traceability (66%)
5. Recall plan (66%)

The Big Picture

From year to year, the major trends shaping food manufacturing haven't changed as much as they've changed positions on the list of things that are creating challenges for processors. But what is clear is that between changing consumer demands, workforce challenges, regulatory and food safety requirements, and automation challenges, food processors have any number of things to worry about.

For the complete survey head over to:
http://bit.ly/food-eng1



Food and Beverage NEMA and IP Protection Ratings and Requirements

The food and beverage industry has strict requirements to prevent the growth of bacteria and eliminate any possible food contamination to protect consumers from any foodborne diseases resulting from improper machine and production line desinfection. To assist in meeting these standards, many products are developed to withstand the rigorous cleaning and disinfection procedures required to maintain clean and safe areas.

For example, the Schmersal pushbuttons, switches and indicator lights (aka pilot devices offered by AutomationDirect), are designed for hygienic applications. They feature smooth surfaces and transitions, IP69K ratings and/or ECOLAB approved materials. Other considerations include use of stainless steel or blue colored components that can be easily identified if they fall into food.

Difference Between NEMA and IP Ratings

IP ratings refer specifically to ingress of water (liquids) and solid objects, in other words, Ingress Protection, hence "IP". NEMA covers additional protection standards such as corrosion protection or protection against some atmospheric gases and conditions. They are not related and there is no conversion between the two.

NEMA Ratings	
NEMA	**Provides a degree of protection against:**
1	Incidental contact with the enclosed equipment for indoor enclosures
2	Small amounts of falling water and dirt for indoor enclosures
3	Windblown dust, rain, sleet, and external ice formation. Intended primarily for outdoor enclosures but also for indoor enclosures.
3R	Falling rain, sleet, snow, and external ice formation when used outdoors, and for dripping water when used indoors. Typically used for wiring and junction boxes.
3S	Windblown dust, rain, sleet, and provides operation of external mechanisms when ice laden. Intended primarily for outdoor enclosures but also for indoor enclosures.
4	A pressurized stream of water where an ocassional washdown or where machine tool cutter coolant is used. For indoor/outdoor use.
4X	**Corrosive materials and caustic cleaners. These enclosures are made of stainless steel, aluminum, fiberglass, or polycarbonate and used for food and beverage or applications where total washdowns with disinfectants occur repeatedly. For indoor/outdoor use.**
5	Settling airborne dust, falling dirt, and dripping non-corrosive liquids. Intended for indoor use.
6	Water entry during a temporary submersion at a limited depth. Intended for indoor/outdoor use.
6P	Water entry during a prolonged submersion a a limited depth. Intended for indoor/outdoor use.
12	Falling dirt, dripping non-corrosive liquids, airborne contaminants and non-pressurized water and oil. These enclosures have no knockouts and are used for indoor applications such as automatioin control, drives systems, packaging, material handling and manufacturing applications.
12K	Dust, falling dirt, dripping non-corrosive liquids (except at knock-outs). These enclosures with knockouts are used for indoor use.
13	Dust, spraying of water, oil, and non-corrosive coolant. Intended for indoor use.

Certain ratings are well-suited for devices used in food and beverage applications (in red below).

The FDA recognizes 176°F as the minimum washdown temperature required to sterilize equipment. Therefore, this temperature is used within the IP69K ingress protection rating and for testing procedures. Also, components bearing the IP69K rating must withstand high pressures of up to 1450 psi. Since high temperature and high pressure alone are not enough to prevent the development of foodborne illnesses, an aggressive cleaning agent is required to ensure proper decontamination. Therefore, any product that receives an IP69K rating must also withstand harsh and caustic chemicals.

IP Ratings for Solids		
Rating	**Protection From**	**Description**
0	No Protection	No protection from ingress of objects
1	Objects larger than 50mm	No ingress of objects larger than 50mm (i.e., hands, but not fingers)
2	Objects larger than 12.5mm	No ingress of objects larger than 12.5mm (i.e., fingers or similar)
3	Objects larger than 2.5mm	No ingress of objects larger than 2.5mm (i.e., screwdriver or similar)
4	Objects larger than 1mm	No ingress of objects larger than 1mm (i.e., wires, large bugs and similar)
5	Limited dust ingress protection	No ingress of most dust particles but not complete ingress
6	**Full dust ingress protection**	**No ingress of dust (dust tight). Surpases previous protection limits.**

IP Ratings for Liquids		
Rating	**Protection From**	**Description**
0	No Protection	No protection from ingress of liquids
1	Straight water drops	No vertical water dripping ingress (i.e., 1mm rainfall/min)
2	Water dripping at 15° angle	No water drop ingress at 15° angle (i.e., 3mm rainfall/min)
3	Water dripping at 60° angle	No water spray ingress at any angle up to 60° (i.e., water spray nozzle)
4	Water splash, all directions	No water splash ingress from any angle
5	Water jets	No ingress from a 4.4 PSI (0.3 Bar) water jet at 3m distance from any angle
6	Powerful water jets	No ingress from a 14.5 PSI (1 Bar) water jet at 3m distance from any angle
6K	High power water jets	No ingress from a 145 PSI (10 Bar) water jet at 3m distance from any angle
7	Up to 1m water immersion	No ingress from immersion of lowest part up to 1000mm below water surface
8	Over 1m water immersion	No ingress from immersion of lowest part up to 3m below water surface
9K	**High pressure and temperature water jets**	**No ingress up to 1100 to 1450 PSI (80 to 100 Bar) close range water jet pressure with water up to 176° F (80° C). Surpases previous protection limits.**

Food and Beverage Discrete Applications

Discrete applications in the food and beverage industry are processes or operations that perform a series of predetermined steps and typically use devices whose operation is either “On” or “Off”; examples include sensors that detect the presence of an object or motors that stop or run a mechanical device. With only two states, this can sound simple but many systems for discrete applications have thousands of sensing and control devices, creating very complex systems. The example shown is a bottling line conveyor. Other discrete applications include:

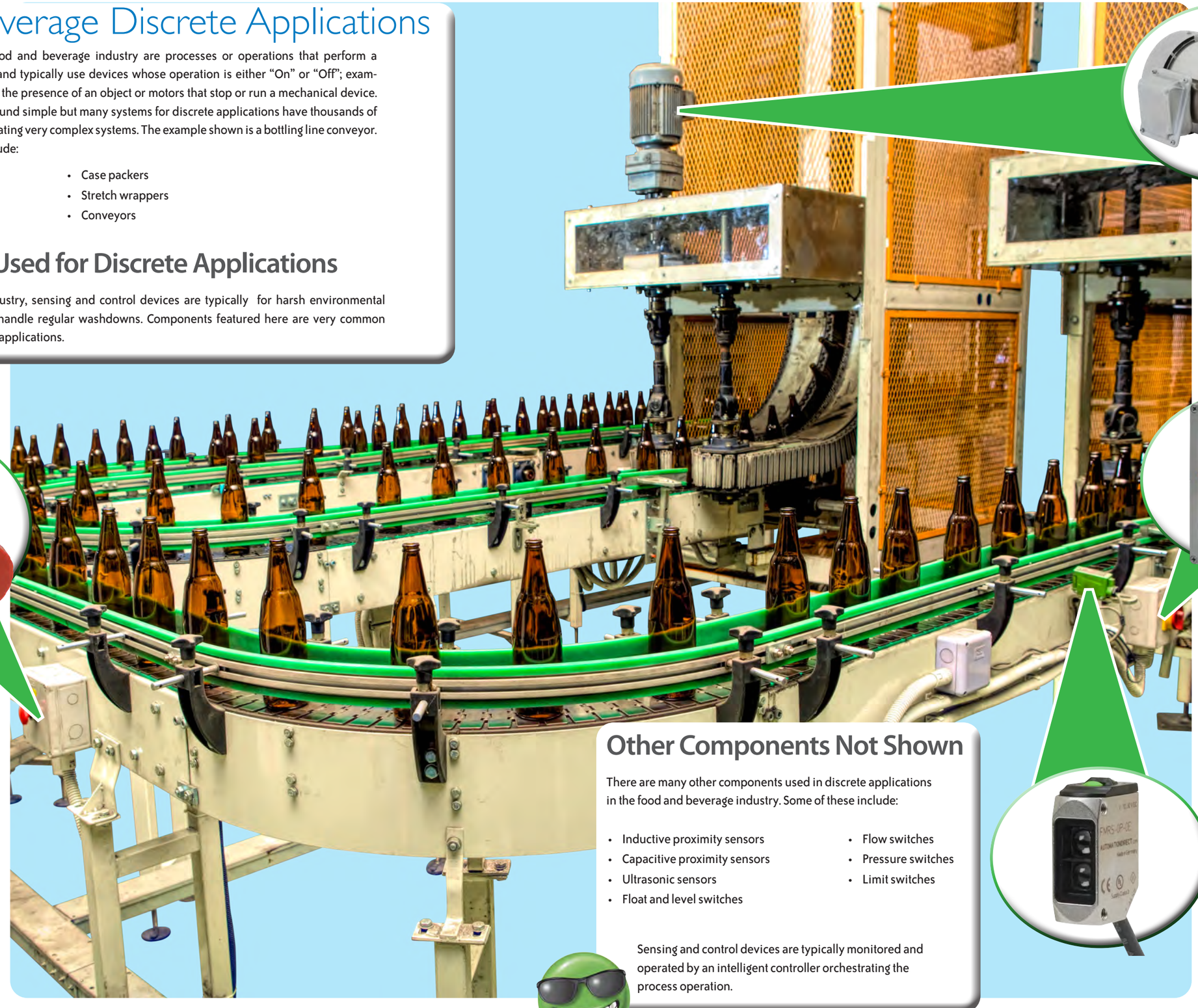
- Palletizers
- Depalletizers
- Accumulators
- Case packers
- Stretch wrappers
- Conveyors

Components Used for Discrete Applications

For the food and beverage industry, sensing and control devices are typically for harsh environmental conditions and are be able to handle regular washdowns. Components featured here are very common devices for automating discrete applications.

Emergency Stop Pushbutton Control Stations

Emergency stop pushbuttons are devices that will immediately put all machinery into a safe state to prevent personnel harm and equipment damage. The control stations shown are stainless steel and washdown rated.



Motors

Motors are the workhorse of many applications and move loads as needed. For the food and beverage industry, they may have a stainless steel enclosure that can withstand washdown.

Local Motor Disconnect Switches

Local motor disconnect switches are used to disconnect power and can be locked out to prevent motion from the connected motor, critical when performing maintenance or other offline operations.

Photoelectric Sensors

Photoelectric sensors detect the presence or absence of an object. They are available in many different sensing, logic and connection configurations. Sensors with IP69K environmental ratings offer the most reliable operation in harsh environments.

Other Components Not Shown

There are many other components used in discrete applications in the food and beverage industry. Some of these include:

- Inductive proximity sensors
- Capacitive proximity sensors
- Ultrasonic sensors
- Float and level switches
- Flow switches
- Pressure switches
- Limit switches

Sensing and control devices are typically monitored and operated by an intelligent controller orchestrating the process operation.

Food and Beverage Process Control Applications

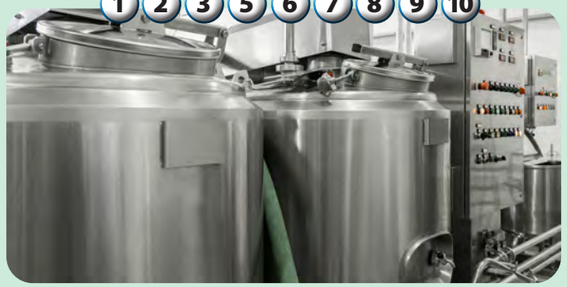
1. Pressure sensing devices measure pressure at a specific point in the process and monitor and/or transmit the measured value to a control device/system.

Process control and measurement implies continuously changing variable data and/or control methods in an industrial process. Different from discrete (ON/OFF) states, numeric values over a set range are sensed and/or transmitted in continuous (flow production) or batch (a set quantity or output) processing. The most common variables used for process control are pressure, flow, level and temperature.

2. Level sensors\controllers monitor levels for liquid, pellet, powder and other similar products in tanks and/or process systems.

Food / Beverage storage and mixing

1 2 3 5 6 7 8 9 10



3. Flow measuring, transmitting and controlling devices provide reliable flow detection and indicating and/or transmitting functions to monitor and/or control the flow of liquids in a process or a system.

Raw materials wash and preparation

3 5 7 8 9

4. Voltage, current or frequency monitoring devices have programmable alarm settings and digital and analog outputs.

Cooking and Processing

2 3 5 7 8 9 10

5. Temperature controllers and gauges provide a direct reading of the current temperature at a specific point and controllers provide means to control temperature setpoints.

The food and beverage industry includes a wide range of processes that are common operations but also includes many processes that are unique and proprietary to each manufacturer. Just about all the equipment and devices used to perform these processes are available from many suppliers. The point is to find that equipment or device that will best serve your process at the best possible combination of price and service. All devices shown are offered by AutomationDirect at low everyday prices, available for immediate shipment and supported by free phone Technical Support.

Process Control

4 6 7 8 9 10

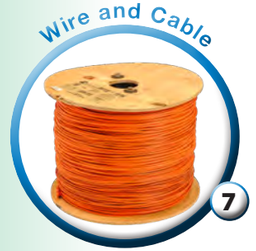
Clean-In-Place (CIP) Systems

1 2 3 5 7 9 10

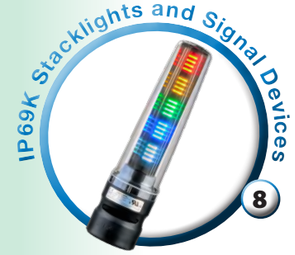
Equipment / Room Washdown

1 2 3 5 7 8 9 10

6. Power monitoring devices are highly accurate and measure standard power parameters, metering and harmonics.



7. Wire and cable for practically any use and in various gauge sizes are available in bulk rolls. Cable is also available in cut to length pieces with low minimum lengths, no cut charges, and same day shipping. IP69K rated cable is available.



8. Stacklights and industrial signal devices are available in pre-configured stacks or configure your own. IP69K stacklights and signal devices are also available.

9. Pilot devices supply simple operator controls and indication for industrial and commercial applications. IP69K-rated controls are specifically designed for food processing, pharmaceutical, and medical applications.

10. NEMA rated enclosures house and protect electrical components and wiring in a wide variety of environments. NEMA rating standards define the degree and type of protection.

Automation Helps Turn Homebrewer into Brewhouse

Figure 1: These conical, jacketed, 30-barrel tanks are cooled during the fermentation process using three glycol-filled bands.

South Florida Distillers designed and programmed a touch screen operated fermentation temperature control system for a new brewery installation at 26° Brewing. The system is responsible for precise temperature stabilization and control of fermentation tanks (Figure 1). The control system is based on an AutomationDirect PLC (Figure 2) and touchscreen human machine interface (HMI). The system is being used to control the fermentation process in five stainless steel 30-barrel conical fermenting tanks adjacent to the brew house.

Figure 2: An AutomationDirect Do-more PLC controls the temperature and level of the brewery's seven fermentation tanks, as well as the brite tank and cold liquor tanks downstream.

Fermentation Control, The Cold Side

Fermentation tanks need to be cooled due to the heat produced by the metabolic process of converting sugar to alcohol. The fermentation part of the brewing process is where the beer spends most of its time. Controlling temperature during this "cold side" fermentation process is critical to the quality of the finished product. The general purpose of the cold side automation system is process monitoring, process control, data acquisition and data logging of the fermentation process. Much of the process upstream of fermentation is manually controlled.

Although individual PID temperature controllers could be used at each of the tanks, the single AutomationDirect controller was a better solution and less expensive. The added value from the PLC comes from the remote viewing and control of the process, and the ease of training new users. The design also required less work by the electrician, and will be less expensive when it comes time to expand the brewing process.

The PLC includes two multipoint AC output modules to control the 19 solenoid-actuated water valves. RTD sensors are connected to PLC input modules to measure tank temperatures using clean-in-place RTD probes. Each of the five fermentation tanks has three cooling zones, with cooling solution flow controlled by one valve per zone, for a total of three valves per fermentation tank.

The temperature of each fermentation tank is controlled by a PID control algorithm running in the PLC. For each tank, a PID loop uses the tank RTD sensor as the process variable input, and controls three ball valves via the PID controller output. These valves control the flow of a glycol/water solution at each tank jacket. A ramp/soak pattern can be programmed to last for days or weeks based on the beer being fermented.

HMI and Remote Access

The HMI has a custom-designed user interface which mimics the flow of product through the brewery (Figure 3). The controller and HMI are networked together through an Ethernet switch, as is a wireless access point. This access point provides network connections for both local and remote access to the C-more touchscreen via iPad, iPhone and Android apps running on smartphone or tablet mobile devices.

This system adds tremendous functionality and makes interaction with the automation system more user-friendly and easier to set up than with multiple temperature controllers. The automation system provides data logging locally at the PLC, and remotely through the Ethernet switch.

All of the process data is emailed to a selected group of users at periodic intervals or upon an alarm condition. Email addresses and recipients can be added or deleted at the HMI. High and low temperatures alarms, deviation alarms, and other conditions can each trigger an email.

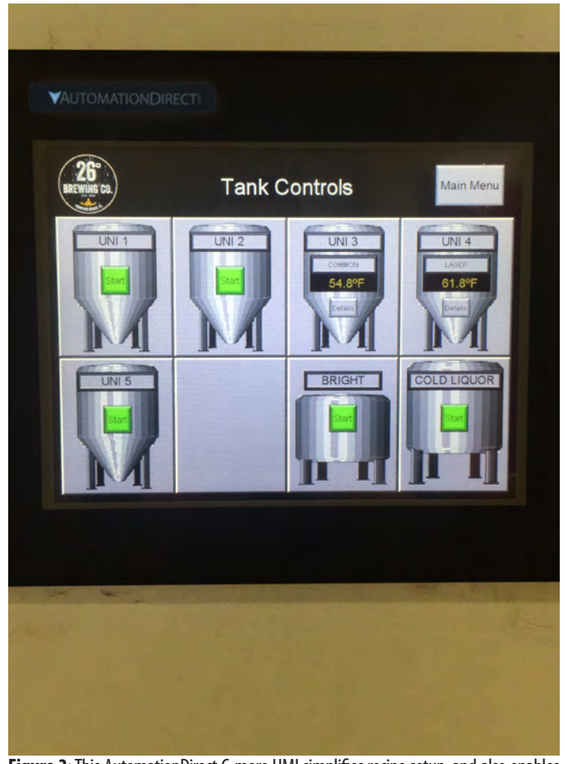


Figure 3: This AutomationDirect C-more HMI simplifies recipe setup, and also enables remote monitoring and control functions via mobile devices.

Startup and Results

The initial startup involved training the PID algorithms for the three different sized fermentation tanks.

Training the PID loop for each tank required opening and closing the valves to see how quickly the temperature of the water in the tank changed. Once trained, the system performed as expected and the client was able to sleep better knowing that each batch of beer has a watchdog to notify him and other operations personnel of any mishaps. There is always room for additional automation throughout the brewery. There areadditional designs for motor controllers and valve routing systems ready to be built, just waiting for the right time.

To read the complete application story please visit:
http://go2adc.com/brew

Advanced Automation, LLC Takes Baking to The Next Level

Advanced Automation, LLC, in Riverdale, New Jersey, is an automation systems manufacturing company specializing in creating solutions for companies in need of more efficient automated processes.

One such need is in the baking industry. Food associations, such as the British Retail Consortium (BRC), Safe Quality Food (SQF) and the American Institute of Baking (AIB), are setting stricter regulations on tracking ingredients from their origin, to the warehouse, to the manufacturer, and ultimately to the retailer. With these increasing regulations and food safety requirements, many bakeries find it difficult to efficiently produce quality baked goods that are still affordable to consumers.

Advanced Automation developed the Batch Process Analysis system (BPA) geared specifically toward the baking industry to substantially improve the production process. BPA assists users in following common regulatory requirements and food safety practices, as well as automatically aid in analysis of inventory and product expenditures.

The expandable system is equipped with stainless steel ingredient hoppers which are mainly controlled by two AutomationDirect PLCs and an industrial PC. SCADA software tracks and records the activities of daily production runs, allowing bakeries to adhere to the very strict standards set forth by the food associations. This SCADA technology also enables users to trace individual recipe batches back to unique lot numbers.

By integrating major ingredients, such as flour, oil, and water, along with the minor ingredients, bakeries can easily repeat the desired outcome every time. The software also allows users to easily set production schedules as well as create new recipes with a few simple keystrokes.

Due to the precision of BPA, many bakeries using this system have been pleased with increased productivity and efficiency. They are assured that information being conveyed to the end user is accurate at all times. The SCADA software populates all production activity which can then be easily sorted to answer various queries, allowing information to be traced from the manufacturer to the retailer.

Until now, it has been cost-prohibitive to replace manpower with automation; therefore, many facilities still perform much of the micro batching by hand. With BPA, human hands are virtually no longer required to complete recipes.

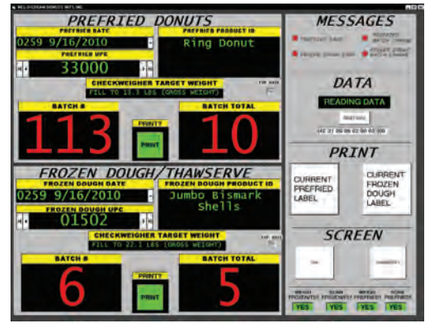
Automating a Donut Packaging and Labeling Line

Founded in 1932, Mel-O-Cream International manufactures bakery products including donuts, primarily for wholesale distribution to supermarkets and bakeries. Over the years, as donut manufacturing capacity grew, so did the demand on product packaging processes. For this reason, Mel-O-Cream decided to automate their donut packaging system.

The control system design was kept simple by having one Excel spreadsheet hold all the data, one PLC to control all I/O and communication, and one PC-based Visual BASIC application developed in-house. Photoelectric sensors mounted at different heights identify when and which size case is present. As a case passes its respective sensor, a bit is set in the PLC memory. The Visual BASIC application polls the PLC memory address to determine when a case has passed the sensor and increments the count.

The PC displays the current batch number with case count and allows the operator to select the correct label information to be printed. The PC then sends the appropriate print job to the printer, which prints the label and applies it to the case.

A downstream scanner reads the barcode to begin the validation process. If the barcode data is incorrect or missing, the system rejects the case at the checkweigher station; otherwise the case is weighed, and the system compares the reading with the ideal weight for that product type. Communicating with the variable frequency drive (VFD) through Modbus protocol, the PLC slows the conveyor speed to stop the case at the scale to obtain its static weight. The checkweigher sends the case weight to the PLC in ASCII via conventional serial RS-232 connected to a CoProcessor module. The PLC compares the scale weight to the target weight. If the case is within tolerance, the PLC routes the case to the palletizer by activating the diverter mechanism. If it's out of tolerance, the PLC activates the rejection mechanism.



Mel-o-Cream engineers state, "AutomationDirect products were chosen because they're very feature rich and extremely durable. Their small footprint PLC is a giant in its capabilities. Its communication capability, expansion slots, and a great selection of add-on cards make it the perfect multitasking PLC for the majority of automation projects. To date, more than 7.5 million labels have been printed and applied, and the system is still going strong."

To read the complete application story, please visit:
http://go2adc.com/donut

Powerful PAC upgrades Tortilla Machine

Casa Herrera builds tortilla preparation equipment for the corn and flour tortilla industry, provides equipment for the bakery and snack food industries, and is the preferred supplier to several national brands. We build several varieties of our machines to meet customer specifications, and we install and service all the equipment we manufacture.

With modern automated tortilla machinery, there are many critical timing points throughout the production line. The product is very sticky at the beginning, slippery in the middle, and flexible at the end, making the equipment setup for each area very exacting. An AutomationDirect Productivity3000 controller helps everything stay in sync by controlling all parts of the production line.

Phil McCall, our control system designer at Memco, explains: "In the overhead proofer, each tray is about two inches apart and has a row of nine baskets. Based on the product pattern, two to six pneumatic trippers have to pop out between the trays, tip the tray over to dump the dough balls into the loader and then retract – all in a fraction of a second. This timing is controlled by a main shaft encoder on the proofer, and a proprietary algorithm tips the trays with the proper amount of advance, so the trippers always pop out dead center at different tray speeds."

Another critical timing point is the maximiser between the press and oven infeed. Its purpose is to fill the oven evenly and completely for a good bake, even though the product is coming in uneven slugs from the press.

McCall further explains, "We use the extensive math ability of the Productivity3000 to adjust maximiser top and bottom belt speed, acceleration and deceleration. This allows the machine to accept the rapidly moving slugs from the press and lay them down into an even stream for the oven. The Productivity3000 is one of the fastest processors I have ever programmed. With the ntire line programmed and running, the scan time of the processor and all I/O is 0.6ms. This makes the machine very responsive to the operator. "

One of the most unique features of the control system is the transfer of motor drive information. If a customer has a faulty motor drive – the repair procedure is to turn off the power, unplug the communication cable, install the new drive, plug in the communication cable and power up the drive.

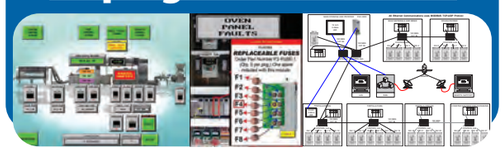
Because all motor drive parameters are stored in the Productivity3000's CPU, upon first scan the processor recognizes the new drive. It then reconfigures the communication port for remote control and downloads all drive parameter settings, all in about 3 seconds. This means that local plant personnel don't have to be familiar with motor drive or control systems programming to replace a drive.

The installed C-more HMI screens allow live real-time remote viewing and control, so the screen faults can be seen from anywhere. For detailed off-line analysis, the data logs, fault logs and event logs stored on the local USB memory stick can be viewed and downloaded using FTP.

Since the commissioning of the first Productivity3000-based tortilla line for True Foods in Melbourne, Australia, we have gone online from California to monitor the control system in real time. We have added customer-specific changes to the program, and we've tuned motor drive parameters.

Article excerpted from original written by:
Ron Meade, Chief Executive Officer, Casa Herrera

Read the entire article:
http://go2adc.com/PAC



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AutomationDirect is a non-traditional industrial controls company using the best ideas from the consumer world to serve your automation needs. We deliver quality products fast for much less than traditional suppliers. See below . . .

You need quality products at great prices.

Product	AutomationDirect Price/Part Number	vs.	Competitor Price/Part Number
Proximity sensor, 18 mm, 3-wire PNP DC shielded, with quick disconnect	$15.00 PBK-AP-1H		$89.04 A-B 872C-D5NP18-D4
AC Drive, 5 hp, 460V	$432.00 GS2-45P0		$1,627.50 A-B 22B-D010N104
NEMA 12 Enclosure, steel, wallmount (20" x 16" x 8")	$290.00 N12201608		$477.51 Hoffman A-201608LP

*All prices are U.S. published prices, subject to change without notice. AutomationDirect prices as of 11/4/2019. Hoffman prices are taken from www.alliedelec.com 4/30/2019. Allen-Bradley prices are taken from www.wernerelectric.com 4/29/2019. Prices may vary by dealer. Many other part numbers are available from vendors.

For over two decades, we've been offering a better value on industrial controls by running our direct business efficiently and passing the savings on to you. No complex pricing structures or penalty for small orders, just low everyday prices on everything from fuses to motors.

Programming software for products can be costly, so we help you out by offering **FREE downloadable software** for our most popular products, including all our latest PLC families and C-more Micro HMI. No license or upgrade fees to deal with!

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