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FEBRUARY 2015

Food & Beverage Manufacturing in 2015

Five looks at keeping the plant
clean and running efficiently.

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Rampant Optimism

Our Manufacturing Outlook Survey finds food production professionals entering the new year with fewer questions and more optimism.

By Kevin T. Higgins, Managing Editor

Greater confidence and certainty about the future – for both their own and their organizations’ prospects – characterize food professionals’ attitudes as they look forward to 2015, according to feedback from FOOD PROCESSING’s 14th annual Manufacturing Outlook Survey.

Four out of five survey participants expect staffing at their locations to increase or be maintained at current levels, up more than 9 percentage points from a year ago. Three-quarters are optimistic or very optimistic as they head into the new year, up from two-thirds a year ago. And fewer than one in 20 anticipate a reduction in production at their plants, down 11 percent from last year’s level.

Results are based on our online survey of 177 FOOD PROCESSING readers who received email invitations to complete a questionnaire that provides a snapshot of trends in production and investment, continuous improvement, energy policies, worker safety and other areas. Responses came over a three-week period ending Nov. 20.

Most respondents work for U.S. food & beverage companies, though a subset of production professionals from outside the U.S. provided feedback. Food safety is the most important of 11 manufacturing issues presented to both groups, and rankings were consistent for several other issues, as well.

However, foreign workers rated automation as the third most important issue, while U.S. workers scored it ninth, ahead of only

energy concerns and wastewater & solid-waste management. Conversely, worker safety and labor issues are a bigger concern among U.S. professionals, ranking second and sixth, respectively. Their non-U.S. counterparts rated worker safety fourth overall, and labor issues were 10th. U.S. workers also are more concerned with cost control.

Many survey participants went beyond the 11 listed manufacturing issues to volunteer thoughts on other pressing concerns. Training was the most frequently cited need across multiple staffing levels. Supply chain

issues, energy costs and capacity constraints also garnered multiple mentions.

“A top concern for us is the new food labeling regulations,” wrote Teresa Kloch. A food technologist with a regional ice cream manufacturer, she notes, “This will create a lot of formula revisions for many.”

Food production continues to trend upward, with seven of 10 surveyed anticipating increased throughput at their facilities this year. They should get the tools needed to realize an increase: Almost three-fifths indicate capital budgets will increase this year,

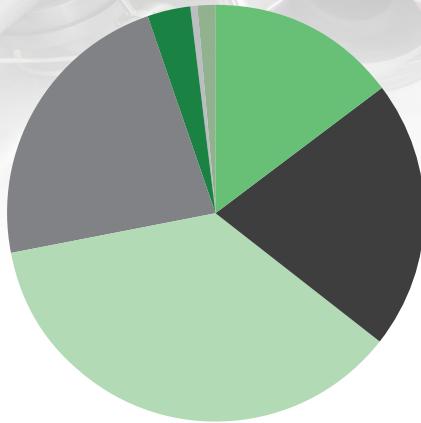
FIGURE 1
Manufacturing priorities for 2015

	First-place votes	Rating avg.	Rating avg. last year
Food safety	51%	8.7	8.4
Worker safety	28%	7.4	New
Cost control	21%	7.0	7.2
Inspections/certifications	21%	6.3	6.1
Food Safety Modernization Act	18%	7.5	5.9
Sourcing and materials	13%	6.4	6.0
Automation	12%	6.2	4.7
Labor	11%	6.3	6.1
Energy concerns	9%	5.8	5.3
Environmental/sustainability issues	9%	6.0	5.2
Solid waste & wastewater management	9%	5.7	New

Respondents could vote for more than one first-place topic.

FIGURE 2

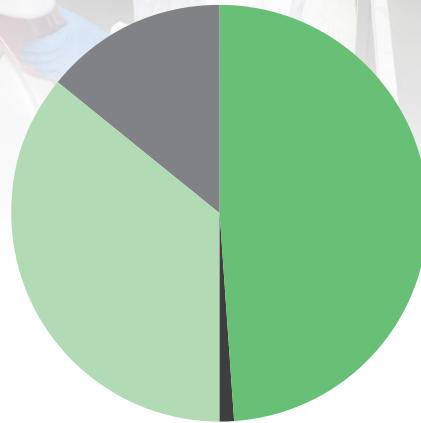
Do you anticipate your plant's production in 2015 to...



- Increase 20% or more.....15% (LY 15%)
- Increase 10-19%21% (LY 26%)
- Increase 2-9%.....37% (LY 33%)
- Stay about the same23% (LY 21%)
- Decrease 2-9%.....3.5% (LY 1%)
- Decrease 10-19%5% (LY 2%)
- Decrease 20% or more.....1.2% (LY 2%)

FIGURE 3

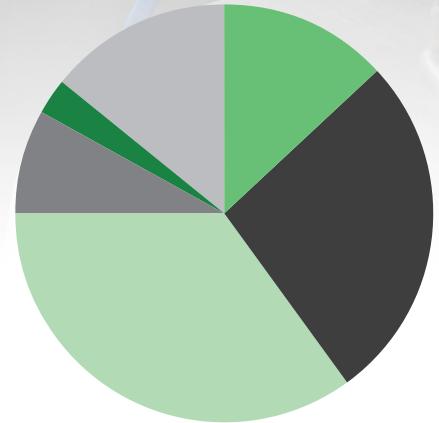
What will happen to salaries at your facility in 2015?



- Increase.....49% (LY 44%)
- Decrease.....1.2% (LY 0.7%)
- Maintain.....36% (LY 30%)
- Don't know.....14% (LY 25%)

FIGURE 4

In 2015, does your facility plan to...



- Add to the workforce..... 31% (LY 37%)
- Maintain staffing level..... 40% (LY 41%)
- Passively reduce workforce..... 9.3% (LY 9.4%)
- Actively reduce workforce..... 3.3% (LY 4.9%)
- Don't know..... 16% (LY 8.2%)

including two-fifths who say CapEx will be up at least 5 percent. Only one in eight is dealing with capital belt-tightening.

Paydays should be a bit brighter, with half the participants expecting salaries to increase in 2015, up four points from a year ago. The most striking change in salary expectations is the drop in uncertainty: A quarter of last year's sample pleaded ignorance about their companies' payroll plans, almost double this year's ratio. Staffing plans also are clearer, with half as many in the dark about 2015 staffing plans as a year ago.

Consolidation remains a reality in food manufacturing, and the ratio of professionals who expect their organizations to consolidate production this year nudged up to 16.5 percent, from 11.3 percent. A slightly smaller ratio of food professionals expects production to expand at their facilities. On the other hand, this might be a reflection of a more stable and predictable future: Only 7.1 percent indicated they don't know their

employer's plans, down from 10.7 percent.

Automation may be a ho-hum issue in the U.S., but there will be no shortage of projects this year. Seven in 10 respondents say there are plans to automate portions of production or the entire line, up from only half a year ago. Packaging automation will see almost as much activity, with 54 percent reporting scheduled spending in some packaging areas or entire secondary packaging systems. Maintenance, repair & operations will receive attention at about one-quarter of plants.

Muddled priorities

Worker safety and continuous improvement are priorities for most food companies, but the survey paints a mixed bag of approaches. While two-thirds say senior management makes worker safety a top concern and tries to make it part of the company culture, there is less attention being paid to near-miss events, machine guarding and peer observa-

tions and feedback on at-risk behavior. Perhaps consequently, the proportion of respondents saying reportable injuries are steadily declining at their facilities dropped to 36 percent from 41 percent.

A slight majority (55 percent) indicate their plants have a safety committee that regularly reviews performance and recommends changes.

About half of the manufacturing sites represented in this year's sample have instituted formal programs for continuous improvement, similar to last year's results. However, there was a drop-off in the proportions using specific approaches (the exception is total quality management, which is now used in three out of 10 plants).

Not every organization embraces continuous improvement, even when a formal program exists. "This is not important to us," one baked goods manager wrote. "(We) just lie about what rate we run so that our numbers look better to corporate."

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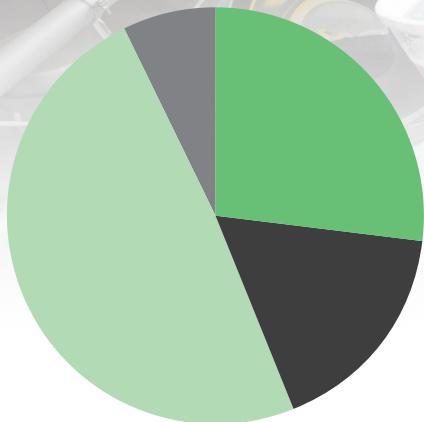


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FIGURE 5

For 2015, is your whole company planning to...



- Expand production or no. of plants27% (LY 31%)
- Consolidate production or no. of plants17% (LY 11%)
- Stay the same49% (LY 47%)
- Don't know..... 7.1% (LY 11%)

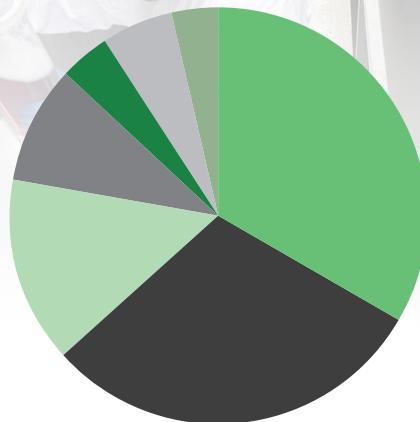
Implementation of MLO (maintenance line optimization) two years ago at an Ohio shrimp processing plant is paying big dividends in reduced downtime and faster start-up, according to food professional Bea Quintanilla. Besides triggering a root-cause analysis whenever a machine goes down, the program helps involve line workers in continuous improvement. “Engagement is greatly improved because people feel valued and appreciated,” she says.

“Our organization has an Ideas program in place where staff is encouraged to generate and submit ideas that elevate our organization,” volunteers Andrea Carlson of Morton Salt Inc. “Sometimes compensation is given for ideas, depending on the outcome.” Her company also is a Kaizen practitioner.

Lean manufacturing remains the most popular continuous improvement approach, with a third of respondents indicating they apply lean principles. The use of OEE (overall equipment effectiveness) data to drive improvements fell to about one in 10, almost half last year’s level, and notable declines in 5S and value stream mapping also are evident. A marginal uptick in Kaizen was regis-

FIGURE 6

Manufacturers’ movement to GFSI-sanctioned food safety standards



- Have not sought GFSI certification.....37%
- Considering audits under GFSI standards 33%
- Certified under SQF16%
- Certified under BRC10%
- Certified under FSCC 22000 4.2%
- Certified under IFS..... 6.3%
- Certified under Other Standard.... 3.8%

tered, though events still occur at fewer than one in five facilities.

A greater emphasis is being placed on employee training in sanitation and food safety practices, with almost three-quarters saying training is a focus. There also is more emphasis on pest control programs and the use of equipment with effective sanitary designs.

Only two in five say third-party certification or a focus on the HACCP program is part of their food-safety strategy, down 5-10 percent from a year ago. Only one in seven are engaging outside experts and consultants, down from almost one in four.

Implementation of the Food Safety Modernization Act is on many food professionals’ minds, making it one of the top three issues in 2015. The Global Food Safety Initiative (GFSI) is the self-policing alternative to tougher regulations. Implementation of GFSI-sanctioned standards barely budged in the past year, with respondents roughly divided into thirds among those who have been certified, those who are considering

certification and companies that have not sought certification. Among non-U.S. participants, almost half have not sought certification.

SQF, the safety standard owned by the Food Marketing Institute, remains the most popular GFSI option. Half of respondents who have adopted a standard opted for SQF level 2 or 3, down from three out of five last year. The UK’s BRC standard increased its client base to 27 percent, and IFS doubled its penetration to 16 percent. FSSC 2200 is the standard for one in 10. (Multiple standards are used at some multi-site food companies.)

Among non-U.S. respondents, standards adoption is evenly split among IFS, FSSC and BRC. SQF certification was achieved at only one firm.

Next-gen staffing

American manufacturing is in the midst of a workforce generational change. The Social Security Administration estimates 48 percent of supervisors will be eligible for retirement this year, and many will join the annual wave of 4 million baby-boom retirees in each of the next 11 years.

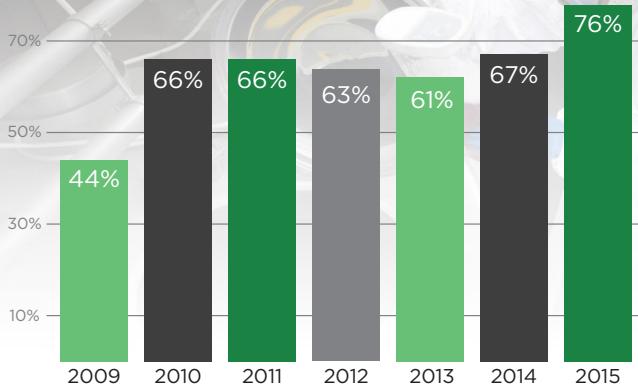
Some food companies will be blindsided by staffing shortages, the survey suggests. Asked what their organization was doing to address the issue, more than a third checked, “Not much at all – just hoping for the best.” Among the more proactive, slightly more than half indicate partnerships with community colleges and trade schools are either being expanded or discussed. Half also participate in job fairs and campus recruitment programs.

Apprenticeship programs for skilled positions and mentoring of high school and college students are in place at more than a third of the proactive companies. Only one in 10 is working with trade unions to attract skilled workers, and 15 percent have outreach initiatives to junior high students in science, technology, engineering and math.

Less complacency is evident in meeting the here-and-now need for skilled workers to keep automated systems running. Only one in five organizations is failing to address the issue. The most common strategy is expansion of in-house technical training, followed

FIGURE 7

Do you feel optimistic going into the new year?



by recruitment of maintenance technicians. One in five is increasing in-house engineering capabilities.

State and local grants for job creation can help address the skills gap, notes Laurie Keeler, R&D director and a principal at Monument Foods LLC, a wholesome-snacks processor. Working with economic development agencies that provide those grants can help attract the skilled workers needed to make “the leap from artisan production to the next level,” she says.

Cheap energy is tamping down enthusiasm for green initiatives in some quarters, though the vast majority of food companies remains committed to resource reductions. Half of respondents say sustainability initiatives have the same importance now, and one-third say they are becoming more important, the same ratios as last year.

Plentiful supplies of natural gas make it difficult to get a return on gas consumption-reduction efforts, with one in 10 respondents indicating gas efficiency projects are on hold. One-quarter say there are no energy-related projects in the works at their plants. Half of the other plants are seeking reductions in electricity consumption.

“We installed motion detectors in all of our warehouses, along with LED lighting,” offered one dairy processor, adding, “A few times a year we power down any unused equipment.”

The survey presents eight specific actions to alter an organization’s energy profile. One-third of the energy-aware companies were pursuing at least three of them. Energy use monitoring was

FIGURE 8

What programs do you use for continuous improvement?

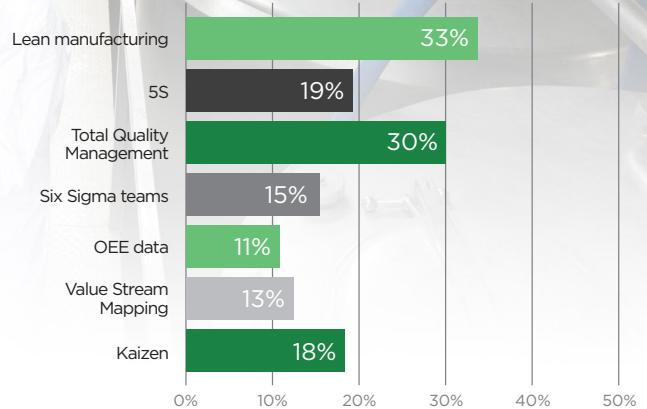
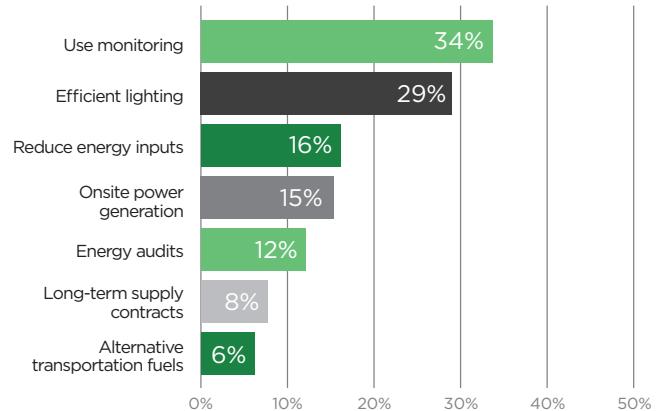


FIGURE 9

Energy management strategies



the most popular, followed by lighting efficiency projects. One in five factor energy consumption into total cost of ownership calculations for new equipment, and almost as many have instituted goals for reducing energy inputs per ton of finished goods. Almost one in six is considering options for on-site power generation.

Supply chain issues, new regulations and other factors will challenge food companies and add complexity to the job of production, but managers are tackling them with greater confidence and assurance.

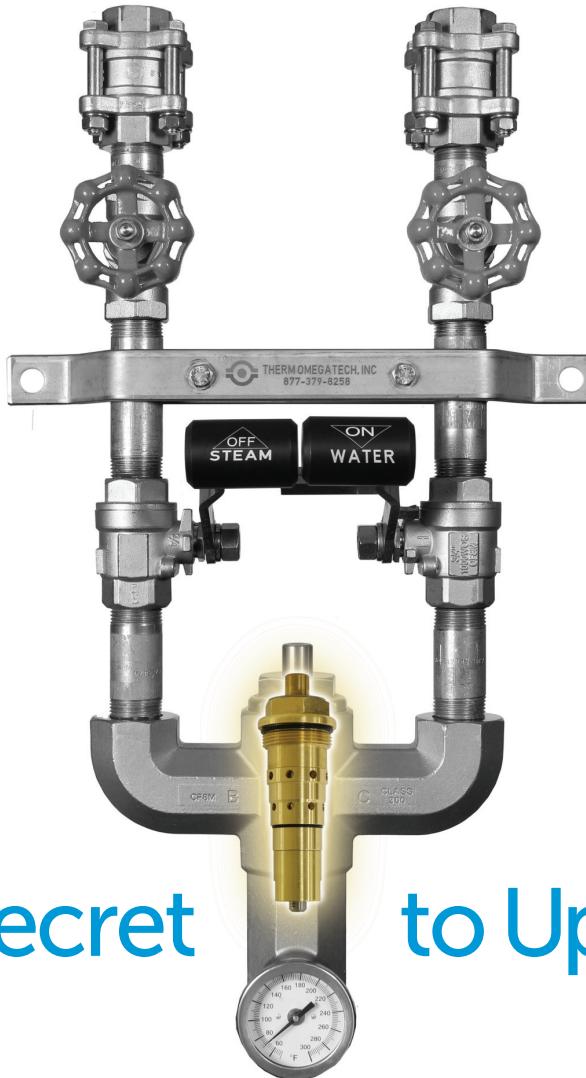
“Most (managers) realize they need to be more productive,” observes Steve Kornman, a food safety consultant who works with large and mid-sized processors. That goal won’t be achieved with machines and automation alone but with recognition of “the importance of employee loyalty,” he wrote. “Happy employees are more productive employees, plain and simple!”

The recent economic upheaval created stress for both individuals and organizations. As normalcy returns, the conditions for productivity gains are becoming more favorable. **FP**



MORE ON THE WEB

As the name implies, our annual Manufacturing Outlook Survey is indeed an annual affair. While we’ve provided some year-over-year comparisons here, you can go back through the 13 previous editions to see how manufacturing issues played out. Go to www.FoodProcessing.com and enter “manufacturing survey” in the search bar. Sort by relevance, not by date - we have too many stories that use both terms.



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Consider the Benefits of Color-Coding

By Remco Products

Many food processors are taking proactive steps for food safety by instituting color-coding as part of their Good Manufacturing Practices. These practices provide a foundation for HACCP (Hazard Analysis and Critical Control Points) — a management system in which food safety is addressed through the analysis and control of biological, chemical, and physical hazards from raw material product, procurement and handling, to manufacturing, distribution and consumption of the finished product. Currently there are HACCP procedures developed for dairy, juice, seafood, and retail and food service.

One can easily see how other types of processing facilities could also benefit from color-coding systems. People who work with chemicals, pharmaceuticals, trash, recycled materials, sanitation, other raw materials or those who are concerned with hygiene could also consider color-coding as a benefit in their facilities.

How color-coding can be applied

Color-coding is often part of businesses that follow a 5S System. Businesses integrate color “cues” throughout a work process or facility in order to reduce waste and optimize productivity. Color-coded tools intuitively complement and support the goals of a 5S workplace. The color-coding promotes a workplace culture where tools and supplies are placed where they are

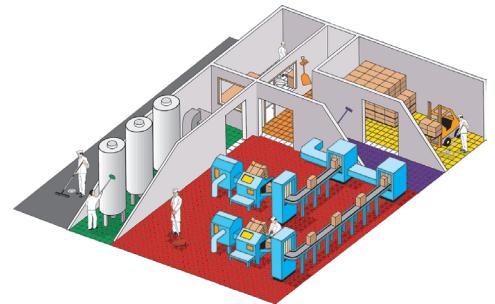
needed and well-maintained for longevity of use.

Color-coding can be implemented to provide “zone control” within a facility. Different colors can be assigned to each step in a process, by manufacturing lines, or even environmental zones. To assign a color, qualifying the level of care needs to be determined in order to prioritize a component of your facility. When colors are assigned to zones, confirming that a tool is misplaced is easy, and tracing it back to its point of origin is quick. This level of organization can translate to the prevention of a costly recall.

Color-coding may be useful in instances where zones aren’t necessarily required, such as dividing and indicating different work shifts. For example, if you need to distinguish between “1st shift” and “2nd shift” you can use two different colors to specify this. In this situation, shift employees are taught to understand which colored tools are for their shift, so they’re less likely to use another shift’s tools. Using color-coding to designate shift’s tools in this way can be particularly helpful to companies that closely monitor tool and equipment costs by work shift.

The documentation at each point of use should coordinate with the paperwork used by your Quality Manager so they can easily determine when color-coded work items have been misplaced, misused, stolen, lost or needs replacing, as well as your Purchasing

Department so they can re-order products with greater ease. The result can reduce incidences of misused tools in unapproved areas, as well as fewer lost or misplaced items.



Preventing Functional Cross-Contamination:

Red ■
Green ■

Preventing Departmental Cross-Contamination:

Yellow ■
Blue ■

Preventing Allergen Cross-Contamination:

White □
Green ■
Yellow ■

Guidance for implementing your program

Once a facility has determined color-coding is a positive decision, care should be taken in implementing a color-coding system. Here are some tips for assuring a well-implemented color-coding system:

1. **Keep it Simple:** After you've identified the hazards and the Critical Control Points that can benefit from color-coding, make sure you make your color assignments as simple and logical as possible. Take a holistic approach when deciding on your system so that the colors you select make sense in relation to your process and your employees.
2. **Be Consistent:** Key items within a particular zone or Critical Control Point should be identified with a specific color to provide consistency. Colors should be chosen in a manner that when applied it assures the processes in the facility are followed properly at all times.
3. **Communicate the Program:** Once you decide to implement a color-coding program, be sure you also have a communication strategy for how the program will rollout to your employees. The program needs to be clearly documented, and easy-to-read, concise signage needs to be produced for employees to reference quickly. To help employees after implementation, make tool storage areas and

signage relevant to each other so this information is easy to reference and easy to understand.

Determining your facility's need for color-coding

Many factors can influence a processor's decision to implement a color-coding system. Changes in industry regulations or a new manufacturing line can often be a first prompt.

To decide if color-coding is right for your facility, consider these criteria:

1. Are you looking for an enhancement for hygienically designed tools?
2. Do you need to control cross-contamination in your environment?
3. Is it necessary to segregate tools based on the areas they are to be used, such as floors and drains vs. equipment surfaces, or food contact vs. non-food contact areas?
4. Does your facility process foods that contain ingredients that are known allergens?
5. Does your facility maintain a HACCP plan or a master sanitation schedule?
6. Does your facility employ a 5S System?
7. Does your facility have separate manufacturing lines for different products?
8. Do any of the following groups have regulatory authority over your products, provide input into your processes, or do you look to them for guidance or certification? FDA, USDA, Canadian Food Inspection Agency, Global Food Safety Initiative, Safe Quality Food Institute, Food Marketing Institute, International Organization for Standardization, ServSafe-National Restaurant Assn.'s Food Safety Training, American National Standards Institute, American Institute of Baking International, Institute of Food Technologists, Food and Agriculture Organization of the United Nations, World Health Organization, International Featured Standards/International Food Standard, Foundation for Food Safety Certification 22000, EPA, British Retail Consortium
9. Do you need to overcome language barriers?
10. Do you have a problem with tools getting lost, misplaced or used inappropriately?

If you answered YES to any of the questions above, your processing facility is a strong candidate for color-coding.

Conclusion

Color-coding is an effective way to minimize cross-contamination or other hazards within a processing facility. It can be particularly helpful for maintaining strict work zones, reducing the risk of pathogens, allergens and other foreign contaminants affecting their operations, and minimizing miscommunication throughout a facility's processes. While not a requirement of many regulating bodies, color-coding can demonstrate a company's dedication to the quality and consistency of their products while maintaining a high level of safety for both their employees and end users.

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Label Mix-up Prevention

By Mettler Toledo



Mislabeled products lead to costly recalls, damaged brand image and fines. Using a vision inspection system, manufacturers greatly reduce the risk of mislabeled products reaching the consumer.

Food and beverage manufacturers produce products consumed by millions of customers worldwide every day. An equivalent number of consumers utilize personal care products and household chemicals on a daily basis. All of these products have one thing in common: their labels are the final line of communication between the manufacturer and the consumer.

In the food and beverage industry, labels inform consumers of the ingredients of the product, including possible allergens. Similarly, personal care products and household chemicals list ingredients and provide instructions for use. Household chemicals will also have information on what to do in case of accidental exposure and storage instructions.

The primary function of labels may be to distinguish one brand from another, but perhaps more important is its role in consumer safety. This consumer safety role is one of the major reasons government agencies have strict regulations for what information must be present, legible and correct on all package labels. Manufacturers who distribute products with incorrect or misleading labels must issue a product recall and are subject to fines and other sanctions. The blow to brand integrity brought about by a recall can be disastrous—

even fatal—to manufacturers, so it is no surprise that many are turning to vision inspection in order to ensure the right labels are being applied to the right products.

Label mix-up

Label mix-up is simply defined: putting the wrong label on a product, or the wrong information on a label. This means anything from incorrect labels to incorrect lot numbers, bar codes, or expiration dates. Any one of these defects is enough to cause a recall.

Government regulation

The Food and Drug Administration has set strict guidelines for label contents across all industries, laying out several key pieces of information that must be on all labels regardless of product.

The European Union has similar requirements, mandating that labels clearly display a list of ingredients, manufacturer name and address, and tracking information such as lot number. FDA and EU regulations mandate that a product which fails to meet these guidelines is considered mislabeled and must be recalled by the manufacturer. Should the manufacturer fail to do so, the government is permitted to step in and take corrective measures.

Labels that follow these regulations provide all the information a consumer requires to make an informed decision about a product—by listing product ingredients, for example, consumers are able to

avoid allergens. When allergens are involved, the cost of mislabeled products goes up considerably, as the potential for consumer death enters the equation. The resulting consequences to the manufacturer can be catastrophic.

Causes of label mix-up

Label mix-ups generally spring from one of two causes: operator error and equipment malfunction. Operator error is a mistake made by a human—putting the wrong roll of labels into the labeler, for example, or forgetting to change labels over during a product changeover. Operator error occurs in part because product changeovers are supposed to be executed as quickly as possible. Production speeds are high enough that operators must scramble to refill or change over labels, which raises the risk of a mistake.

Equipment malfunction is slightly less common, but no less disastrous. Printers perform multiple runs of the same label design as manufacturers need them—which in turn risks slight variations in each individual run. The slightest printer error will cause visible problems with the product which may turn consumers off from the brand entirely, or important information may end up missing from the label. For example, a printer may run low on ink, resulting in a missing allergy warning. Similarly, labels that are incorrectly applied to the product can cause consumers to lower their opinion of the brand as well as potentially miss important product information.

These errors should be caught by a quality assurance program, but some manufacturers do not have a robust inspection program. Manual inspection can't keep up with production line speeds of 1000 parts per minute or more, yet some manufacturers still only rely on manual inspection to protect themselves from product defects such as label mix-up. Manufacturers who have a vision inspection system already in place may encounter another cause of label mix-up: system override. As pressure for faster production speeds increases, production managers or system operators may decide to override their QA system. When this happens, even the most obvious label defects make it to the consumer.

Consequences of label mix-up

When a mislabeled product makes it to retailer shelves, a recall is issued—depending on severity, the recall may come from the manufacturer itself or the government may mandate the recall. Regardless of who issues the recall, once it has been executed there are several consequences that must be considered.

Firstly, there is an immediate financial cost to any product recall. Retailers pull all defective products from their shelves and send them back to the manufacturers, who must pay to replace each defective product. The cost of replacing the products is high—some estimates place the average cost at \$30 million—as is the cost of losing retailer shelf space while new products are sent for replacement. This gives

competitors an opportunity to poach consumers who are unable to find the recalled product.

The short term costs are considerable, but long-term costs of a major product recall are even worse. Consumer confidence in the brand may be severely damaged by a recall, and the damage will extend beyond the recalled product. Some consumers avoid the parent brand entirely after a high-profile recall, meaning that manufacturers will not just have lost a consumer from one product, but from any other products the company produces. This has the potential to bring some companies to the edge of bankruptcy—or collapse a company already struggling to remain profitable.

Preventing label mix-up

With the high cost of recalls both short and long term, it is clear that companies must devote themselves to preventing common defects from reaching the consumers. Mislabeled containers account for the majority of food product recalls, and ironically, one of the easiest defects to prevent.

The most effective solution in preventing label mix-ups is to implement an automated vision inspection program. A vision inspection system can inspect 100% of the products on the line without reducing throughput while maintaining the highest level of accuracy possible. Automated vision inspection easily outstrips the detection rate of manual inspection, and with the right control software a vision inspection system can easily change over to new products.

The best vision inspection systems will also come with adjustable user permissions to help prevent system overrides from happening—and if system overrides do happen, user tracking in the control software will show managers who was responsible for the override.

Vision inspection systems can be programmed to check all aspects of a label, from ensuring it is the correct label to verifying the readability of its information. By requiring operators to enter lot codes multiple times—or even requiring two separate operators to enter new lot codes—manufacturers are able to ensure that the correct lot codes have been registered, ensuring traceability. Vision inspection systems will also catch more subtle errors in label presentation, such as improperly spelled or illegible words, unreadable bar codes, and poor-quality graphics.

With the high cost of recalls it is in the best interest of manufacturers to do everything possible to reduce the risk of a defective product reaching the consumer. Label mix-ups are common yet easily-preventable defects, which still manage to cause the vast majority of product recalls. Manufacturers seeking to reduce the risk of a recall without sacrificing production speeds have found automated vision inspection systems to be the right tool for the job. Working with an experienced vision inspection solution provider, manufacturers can eliminate label mix-ups from their production processes, thus reducing recall risk and safeguarding their brand. 

Protect Your Profits and Your Brand!

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METTLER TOLEDO



Rotary Impingement Tank Cleaning Equals Significant Water and Cost Savings

By Gamajet

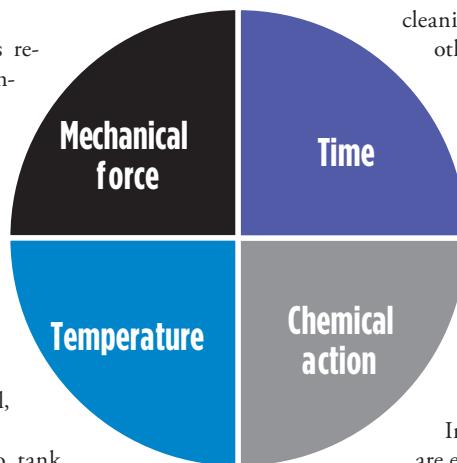
Tank cleaning has always been viewed as a necessary evil for manufacturers. During the cleaning process, a significant amount of resources (time, chemicals, water, electricity and labor) is required between batches not only to appease FDA standards but to ensure a reliable, uncontaminated, quality batch is produced. Although these repeating expenditures have a significant effect on the bottom line, there are food and beverage manufacturers that continue to rely on outdated yet standardized technology for cleaning, not realizing the potential opportunity for substantial cost reductions and revenue recovery through CIP optimization.

To understand how to optimize a cleaning process, one must first understand the basics of cleaning. Herbert Sinner, a former chemical engineer for Henkel, first summarized the basic principles of cleaning in 1959. His summary, now referred to as the Sinner's Circle, describes the four factors that can be manipulated in any cleaning scenario: Temperature, Chemical Action, Time and Mechanical Force.

When the effectiveness of any factor is reduced, it must be compensated with the increase of one or multiple other factors. Washing dishes is an effective example of how the four factors interact. Hot water (temperature) is going to remove stuck on food better than cold. Adding soap (chemical action) makes the process even easier, and you can either soak a dish overnight (time) or scrub the dish clean (mechanical force). When cleaning tanks, it is imperative to examine not only the effectiveness of the cleaning process but the efficiency as well, especially in such a competitive market.

Sinner's Circle can be easily applied to tank cleaning as a way to compare the efficiency of processes. The most common tank cleaning processes are: wetting

(static spray balls), rotary wetting (rotary spray balls), boiling out, manual cleaning and rotary impingement cleaning. Rotary wetting and wetting are more easily understood as a "cascading method." By applying massive amounts of cleaning solution to the tank interior, the residue eventually erodes off. This results in a significant amount of time and effluent consumption and a minimal reliance on temperature and mechanical force (the average force from a spray ball, rotary or static, is approximately .01 lbs). The effectiveness of this cleaning process is accurately described as "fair," often resulting in additional manual cleaning (scrubbing and scraping). The boiling out method offers a similar cleaning at an even slower rate, with even more effluent and temperature, and no mechanical action. Manual cleaning, on the other hand, offers a reasonable amount of mechanical force, with minimal effluent but often results in ineffective cleaning, due to human error. Also, with safety in mind, lower temperatures must be utilized therefore increasing time. Rotary impingement cleaning utilizes the most mechanical force than any other process, therefore reducing time and cleaning solution drastically. Additionally, a repeatable and reliable result is assured.



Sinner's Circle

How rotary impingement works

Rotary impingement tank cleaning machines combine pressure and flow to create high impact cleaning jets. Cleaning occurs at the point at which the concentrated stream impacts the surface. It is this impact and the tangential force that radiates from that point which blasts contaminants from the surface, scouring the tank interior.

In conjunction with this impact, these machines are engineered to rotate in a precise, repeatable and reliable, 360-degree pattern. This full-coverage, indexing pattern ensures the entire tank interior is cleaned,



In one of the worlds largest ketchup manufacturing companies, the Gamajet was used in to clean ketchup from a blender.

every time. This combination of impact in a controlled indexing manner results in an economic homerun, because impact is a one-time investment; chemicals, temperature and time are continual, never-ending expenditures.

Following are three specific incidences in which rotary impingement tank cleaning was used to optimize an outdated cleaning solution.

Example 1: Rotary Impingement vs. Fill and Drain

One of the largest hot dog manufacturers was seeking a solution to the abundance of waste water the facility produced. A majority of the focus was spent trying to alter the manufacturing process, which resulted in minimal savings. Eventually they upgraded their entire CIP process, and the final water savings were staggering.

The company utilized a fill and drain cleaning process to clean a series of four ribbon blenders which were used to mix processed meat.

Cleaning was required daily, between each batch. The effectiveness of the clean, when dealing with such meats remained the primary concern. The residue, a buildup of oil and fats, and the series of blind spots due to the tank design, caused even more difficulties for the company to clean. Like most food and beverage companies, their cleaning process proved effective enough, thus the cleaning method remained the same for many years. The process included filling the tanks with water and agitating the blenders. This was then followed by manually cleaning the blades and under part of the agitator as well as any visually missed spots. Total cleaning time resulted in 4 hours per tank, 5,840 hours of downtime per year. The water consumption

was approximately 18,000 gallons per tanks, 26,280,000 gallons per year (a cost of nearly \$150,000).

After thorough evaluation, it was suggested the company upgrade their entire CIP process, starting with rotary impingement tank cleaning machines.

The new process included a Gamajet steam-operated pump powering five directional Gamajet V rotary impingement tank cleaning devices. The steam pump allowed for the necessary increase in pressure, as well as the hot water needed to clean oils. Steam was also preferred because the plant already had a steady source of steam and the steam pump is highly energy efficient. The pump allowed for the five Gamajet rotary impingement machines to operate at 15 gpm and 120 psi with 180-degree water. The cleaning process included a 5 minute pre-rinse to rid the tank of any bulk residue, a 10 minute wash and then a 5 minute final rinse. This process took 20 minutes for each tank, which was nearly 90% faster than the previous method, saving them 5,354 hours per year. The water usage was reduced by 92%, 1,500 gallons per tank verses the 18,000 gallons per tank previously. This resulted in the savings of 24 million gallons of water per year, and over \$100,000 per year, on water alone. In addition, dangerous manual cleaning was eliminated.

Example 2: Rotary Impingement vs. Manual Cleaning

Manual cleaning is a surprisingly common method. Facilities all over the world are grabbing their hoses, pressure washers and scrub brushes, while locking and tagging out, for their CIP process.

Although nearly every other process is automated, many companies still rely on manual cleaning as an effective way, not only to clean, but to validate the cleaning process as well. Human error aside, no manual clean can ever be absolutely replicated. In addition, margins for error are non-existent.

A facility in San Francisco, CA was utilizing manual cleaning to its fullest extent. The company manufactures a wide range of sauces and was experiencing significant revenue loss to their tank cleaning procedure and they were under significant pressure to provide a more validatable clean and eliminate confined space entry. Their process included 4 kettles with dual agitators and the sauces were burnt onto the tanks. The cleaning process included 2 hours of manual cleaning every day. The manual cleaning included confined space entry, scraping and scrubbing which had a significant effect on their tank downtime and water usage. The tank cleaning downtime was 2,920 hours per year and the water usage was 3,504,000 gallons per year which was costing them a total of \$16, 293.00 per year.

The solution included two Gamajet PowerFLEX rotary impingement tank cleaning devices, positioned precisely around the agitator to ensure thorough cleaning. The machines operate at 90 psi and 40 gpm per machine with 150-degree water, no chemicals. Cleaning includes a 5 minute pre rinse for the bulk residue, a 10 minute re-circulated wash and a final 5 minute rinse. Total cleaning time per tank is now 20 minutes. The pre-rinse of 5 minutes is the length of one-half cycle, and testing proved this to be sufficient for cleaning, however in cases where the residue has burnt on longer an entire cycle is requested for cleaning, followed by the final rinse. This ensures that every area of the tank is passed twice, and satisfies the plant sanitarian. As a result, the facility saves 2,434 hours total in tank downtime per year by cleaning 83% faster. They have also been able to lower the usage of water to 2,336,000 gallons per year, saving them \$10,861.80 per year. Production was increased by nearly 10% and confined space entry was completely eliminated.

A quick history into spray balls and other “cascading” devices: Spray balls and rotary spray devices are, to this day, the most common used tank cleaning devices. Static spray balls were introduced in the 1950’s with the development of CIP. They work in a way that the wash fluid is discharged from numerous holes.

This diffuses the energy of the fluid and, therefore, impact is minimal, often as little as .01 lbs of force. The cleaning action thus results from a sheeting or cascading action with minimal impact from the turbulence as the cleaning solution (chemicals) cascades down the tank walls over long durations.

Rotary wetting, on the other hand, is often a rotating spray ball with nozzles or open orifices. The effluent is typically split four or more ways and, depending on the manufacturer, high body leakage reduces flow to each nozzle. As a result impact per nozzle is not optimal. In comparison to spray balls, the randomness of this wetting is limited resulting in a slightly more exact cleaning pattern, which still relies significantly on time, temperature and chemicals. Prior to the development of impingement cleaners, such devices were readily accepted, mostly because there were no alternatives, they were easy to install and inspect, and provided a better cleaning than the COP process.

Back to our third example: In an effort to establish a more efficient and effective cleaning method, a major food manufacturer, turned to rotary impingement tank cleaning. The results were much more beneficial than expected. The company, located in Mason, OH, operates four continuous production lines, each with 3 tanks. Each day the tanks were shut down for cleaning, which took a minimum of one hour. In many cases cleaning took longer because of regular clogging of the spray balls. There was also additional manual cleaning needed from time to time when the spray balls could not remove the built up residue. The solution was a Gamajet Aseptic VI rotary impingement tank cleaner operating at 115 psi and 15 gpm. Cleaning now begins with a 2 minute pre-rinse to remove the bulk of the residue followed by a five minute re-circulated wash with caustic and a final two minute rinse. The total cleaning time is 91% faster at only 9 minutes. The design of the machine coupled with a filter allows for the debris to pass through or be caught, resulting in no clogging. The facility utilizes the saved cleaning time to increase production by 71%, producing 1,042 batches more per year. In addition the facility reduced its water and chemical usage by 85%.

The above cases are not extreme situations. The evolution of tank cleaning devices has resulted in exponential learning and understanding of cleaning in general. Sanitarians and engineers worldwide have begun not only to recognize the benefits of rotary impingement tank cleaning but also implement them companywide. Today the top food and beverage companies have begun to make the transition to rotary impingement tank cleaning.

For more information or a free consultation please contact Gamajet, which is part of the Alfa Laval Group. With over 70 years of tank cleaning experience Gamajet is dedicated to providing customers worldwide with the most efficient and effective tank cleaning solutions, beginning in the tank with the residue and expanding outward to a complete, mobile state-of-the-art CIP system at an economical rate. 

It's raining dollars on the plant floor

(thanks to our high-impact tank cleaning devices!)



Our tank and tote cleaning devices may be small but they offer huge savings. After installing a Gamajet or Alfa Laval Toftejorg device, companies like yours:

- Reduced time spent cleaning by 85%
- Decreased water and chemical use by 80%
- Increased productivity by up to 20%
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The Price of Safety in Plant Sanitation

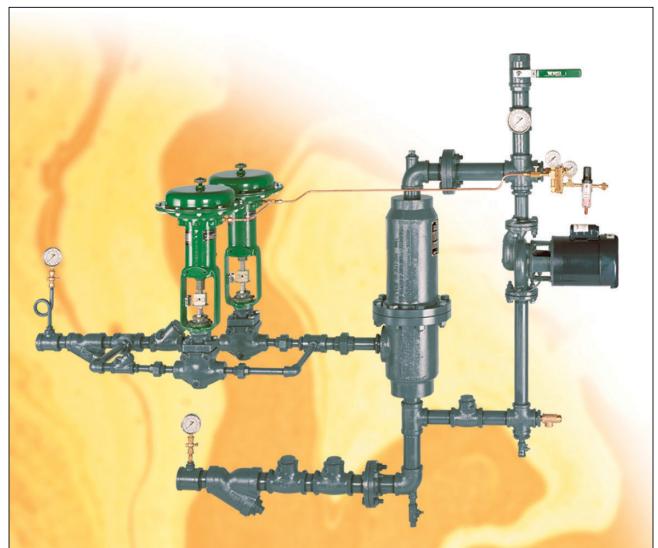
By Mark Brueggemann, Vice President of Sales, Pick Heaters Inc.

Direct steam injection offers unique benefits for heating water or water miscible liquids for numerous food plant applications. It is used wherever an immediate supply of precisely controlled hot water is required, such as sanitation, batch filling, blanchers, clean-in-place, and freezer defrost. Pick Heaters has been providing liquid process heating solutions that use direct steam injection for more than 60 years. Pick also has a sanitary design that can be used for in-line product cooking, the first direct steam injection sanitary heater to earn 3-A Sanitary Standards certification.

Our customers face challenges from many angles. There are ongoing food safety issues, as well as concerns over food borne illness. Energy savings and efficiencies directly affect profitability. Maintenance costs have always been important. Recently there has been a heightened concern for the safety of plant personnel. While the application of the Pick Heater can offer benefits in all of these areas, satisfying the concern for operator safety in plant sanitation is prominent.

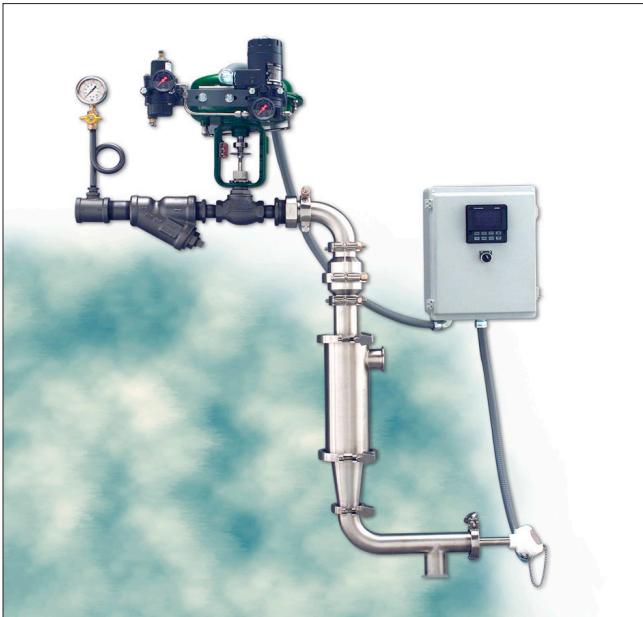
The biggest concern in regards to plant sanitation is that customers need a reliable yet safe supply of hot water. They need water at a precise temperature to satisfy sanitation standards. At the same time, they cannot afford water temperature to exceed set point, resulting in a concern for their operator's safety. They want confidence that their hot water system will provide a safe, reliable source of precisely controlled hot water, regardless of demand.

Safety has become a problem, or risk, at the point of use. One of the more common methods for supplying hot water for sanitation has been the use of individual steam/water mixing stations, or tees, located at each hose station. While these units offer the



Pick Variable Flow Heater

responsiveness of steam injection heaters, they can pose a serious safety risk. Mixing tees require a minimum water supply pressure to operate properly. An internal valve serves to prevent live steam, or overheated water, to exit the hose station should there be a loss in water pressure. This mechanism often sticks due to hard water scaling, which creates a situation where operators have been scalded or injured. It's not a question of whether or not this happens, but when it happens.



Pick Sanitary Heater with a threaded steam line consisting of an iron steam strainer, steam control valve and sanitary non-return check valve.

In addition, water temperature is controlled individually at each hose station. This makes it susceptible to operators unnecessarily tampering with the temperature set point. There is a common misconception that the higher the temperature, the better — this isn't the case. Rather it is inefficient and a serious potential safety concern. Water that is too hot is a waste of energy, but water that is not hot enough won't get the job done or meet sanitation standards.

Pick Heaters developed the Variable Flow Heater with plant wash-down in mind. It is designed to serve as a single, central water heating system that can be isolated from operators and use points. The heater can handle the wide range of water flow rates required throughout the facility. It features a low-head pump that maintains proper water velocity during low loads, while maintaining tight temperature control regardless of demand. It can respond to frequent start-stop applications and still deliver accurately controlled hot water, on demand. Temperature overrides can be put in place preventing any possibility of overheated water from reaching any of the points of use.

After a customer has experienced problems with point-of-use mixing tees, going with another steam injection heating method can be a hard sell. Both mixing tees and the Pick Variable Flow Heater are considered steam injection water heaters, but that is where the similarity ends. Once the customer understands that the Pick heater is being applied as a utility, they see the difference. The Pick heating system can be located well away from worker locations. They get all the benefits of steam injection heating but with operator safety foremost in mind.

Equipment cost for a Pick Variable Flow Heater is typically the same as the cost of replacing four mixing stations. However, it also eliminates the costs associated with running steam lines to all the plant drops. The steam line terminates at the Pick Heater, as a result eliminating live steam at the point of use. Beyond equipment costs, what value can you put on the price tag for personnel safety and reducing the potential liability?

The matter of safety isn't going away. The objective is to continue to identify potential safety problems for customers and to offer solutions. While direct steam injection water heating is the best method, its proper application is key to having a dependable and safe, plant wide hot water sanitation system. Once customers understand the hazards of point-of-use mixing tees, the upgrade to a Pick central hot water system is the obvious answer. 

How Effective Is Your Hot Water?



Clean

vs.



**Perceived
Clean**

The Pick Variable Flow Direct Steam Injection Heater is the answer for general plant sanitation. Its unique design provides hot water at a precisely controlled temperature over a wide operating range. Only Pick can accommodate wide variations in water flows and frequent start-stop applications such as hose stations and still deliver accurately controlled hot water on demand. It is ideal for a central heating system for all your plant sanitation and clean up needs.

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