



# HOW BAKERIES ARE BECOMING MORE EFFICIENT WITH NEW TECHNOLOGY

## CHOOSING TO SPRAY IMPROVES QUALITY AND CUTS WASTE

Like other manufacturing sectors, the baking industry continually faces competitive pressures. In their ongoing efforts to improve quality, boost productivity and control costs, commercial bakeries are finding that spray technology can be a very effective tool in meeting a number of persistent challenges.

This paper discusses bakery operations where spray technology has proven to be effective in solving problems. This is primarily in the area of consumables, where closely controlling application rate and location can reduce waste of costly ingredients and boost overall efficiency and effectiveness.





# AUTOMATED SPRAY SYSTEMS PROVIDE BAKERIES WITH AN ARRAY OF PRODUCTION SOLUTIONS

## PRIMARY BAKERY CONCERNS

Today the four primary concerns in baking, and in the food production industry as a whole, are food safety, employee health and safety, sustainability and doing more with less. Spraying Systems Co. has been working with bakers since its founding in 1937, but major technological advances over the last decade are enabling the company to play an ever larger role in helping bakeries address these concerns. This is especially true with regard to automation, the adoption of which has steadily enabled bakeries to do more with less while also improving product consistency. Automated spray systems provide bakeries with an array of options for reducing waste and increasing product quality and shelf life. Automation reduces waste of costly coatings, ensures uniform application to reduce quality problems and contributes to sustainability efforts through efficient use of resources.

AutoJet® Precision Spray Control systems consist of an AutoJet spray controller working in concert with nozzles selected for each particular application. Although there is great variation among systems, the underlying objective is the same: Apply a precise amount of material at the proper time in the proper location. This approach addresses the cost of consumables head on, because many standard bakery operations result in over- or under-application, both of which drive up costs.

In addition to cutting how much is spent on consumables, reducing waste frequently improves the work environment as well. Eliminating the misty overspray that compromises air quality and causes slippery surfaces contributes to an overall safer working environment. Gaining control over unwanted misting also reduces – and may well eliminate – the need for personnel to be permanently assigned to keep floors and equipment clean in the operating area.

Controlling material application also enhances product quality. Ensuring an optimal application of release agent, for example, means less sticking and fewer rejections. Using only the amount of coating necessary extends the time between pan glazing and pan and conveyor cleaning. Where coatings are being applied to food products, automatic control results in better product consistency, which may also mean better consumer appeal or more predictable shelf life.

Because the expense of spraying excess liquid can escalate so quickly, it makes sense to examine both obvious and sophisticated ways to minimize waste.



## 10 WAYS SPRAY TECHNOLOGY IS SOLVING CHALLENGING COATING PROBLEMS

Many bakeries today are using automated spraying solutions to help reduce waste and increase product quality. The following examples, which follow the process roughly from pan and belt coating through packaging, cover only a few of the many Spraying Systems Co. installations successfully integrated into bakeries around the world. Although most of these involve material application, spray technology is also being used in other applications such as scoring and equipment cleaning.

For more information, go to [www.spray.com](http://www.spray.com) and download the free case studies referred to in this paper. In some cases, videos are also available on Spraying Systems Co.'s YouTube channel, [www.youtube.com/user/sprayingystems](http://www.youtube.com/user/sprayingystems).

### SPRAYING RELEASE AGENTS ON PANS AND CONVEYORS

Release agents are most effective and economical when applied as a uniform, thin coating. Limiting their application to areas where the product touches the pan or conveyor reduces the amount used and simplifies cleanup activities.

1. One artisan bakery was applying a light coating of release agent by hand, from aerosol cans, on its 28" x 36" (711 mm x 914 mm) sheet pans. The process was messy and wasteful, as well as time consuming. Installing an AutoJet Modular Spray System with three self-cleaning nozzles, triggered by a photoelectric eye sensing each pan, now saves the bakery US\$2100 per month in materials – and it's five times faster. **(See Case Study 174A.)**
2. Faced with too many stuck cookies on its wide flat sheet conveyor, a family-owned manufacturer installed an AutoJet Modular Spray System with a spray manifold and four automatic hydraulic spray nozzles. The result was a fine coating of release agent across the full 39" (991 mm) width of the conveyor, eliminating the previously required time-consuming manual application of the release agent. The change also eliminated concerns about worker safety. The automated system is saving the company US\$3500 a month in personnel costs alone. **(See Case Study 146A.)**





### SPRAYING COATINGS ON BAKED GOODS

A light coating of oil frequently is applied prior to baking, and consistently getting just the right amount is a challenge.

3. One hors d'oeuvres manufacturer wanted to apply a precise amount of extra virgin olive oil on each bread slice before toasting. Replacing its old system of air atomizing nozzles with an AutoJet spray control panel and PulsaJet® automatic flat spray nozzles eliminated the need for compressed air as well as eliminating misting and overspray problems. The new system has enabled the company to improve product quality while at the same time reducing olive oil consumption by nearly 75%. The US\$3000 monthly oil savings paid for the system in just a little more than one month.

**(See Case Study 148A.)**

4. A private label manufacturer of frozen pizzas replaced its manually controlled soybean oil distribution trough to improve consistency and control. The new AutoJet spray system is outfitted with PulsaJet automatic spray nozzles and enables the manufacturer to easily and precisely adjust oil application and thus validate calorie counts for each of the different items being produced. The new system also helped the company save US\$38,000 per year on soybean oil and US\$13,000 on conveyor belt replacement.

**(See Case Study 123A.)**

5. Another private label manufacturer sprays a light coating of a corn syrup and water mixture onto a sheet of dough on a

moving conveyor to hold dried granular flavorings applied further down the line. Its old system provided less than uniform coverage and was manually controlled, so it did not automatically adjust the application rate to match changes in line speed. A switch to air atomizing nozzles provided a more uniform coating but created excessive overspray. To get it right, the manufacturer turned to Spraying Systems Co. for an AutoJet Modular Spray System with hydraulic PulsaJet nozzles and Precision Spray Control. The system now provides uniform coverage at exactly the desired rate, even at very low flow rates. It also has increased production, eliminated the misting and mist collection problem, and reduced material use by 60%. The result: a savings of more than US\$70,000 per year.

**(See Case Study 149A.)**

6. Switching from manual application to using automation to apply a light coating of potassium sorbate preservative to its cakes after they come out of the oven is saving another baked goods manufacturer US\$60,000 a year. The AutoJet-controlled system is triggered by a photoelectric sensor to deliver a very low flow through automatic spray nozzles but only when a cake is going by. This has eliminated problems experienced with the previous manual application system, which relied on personnel with brushes and handheld spray bottles. A person is no longer required to apply the material and there is no longer any waste. **(See Case Study 168A.)**



### SPRAYING WATER FOR SEED ADHESION

Bakeries often moisten dough with water so seeds adhere better to baked goods. And although it's only water, precision still counts – too much water makes the seeds sprout, but applying too little allows more seeds to fall off.

7. A well-known British craft bakery gained the necessary consistency and increased production speed by a factor of five by changing from hand wetting to an AutoJet Modular Spray System with PulsaJet nozzles. Best of all, because it uses Precision Spray Control, the application rate automatically adjusts with changes in line speed ensuring the proper wetting regardless of the production rate. **(See Case Study 132A.)**
8. In the largest commercial bakery in Ecuador, the problem was sesame seeds falling off during baking. Replacing an old system that used air atomizing nozzles with an AutoJet Modular Spray System using hydraulic PulsaJet nozzles ensured just the right amount of water was applied to make the seeds stick. It also eliminated other problems including dough that wouldn't rise when too much water was applied and puddles of standing water on the floor. Overall, the new system has reduced the scrap rate by almost 80%. **(See Case Study 138A.)**

### MORE BAKERY SOLUTIONS

#### WATER JETS REPLACE KNIVES

Not all bakery applications are about precision coating. One baked goods producer wanted to score its rolls very consistently before baking. By going from a mechanical splitter to PulsaJet® nozzles with solid stream spray tips, the manufacturer eliminated the possibility of blades sticking to the dough, which had been creating frequent maintenance headaches and a significant amount of waste product. A photoelectric sensor detects each pan of rolls, signaling the AutoJet spray controller to initiate the scoring cycle. The PulsaJet nozzles' needle-like water sprays are precisely coordinated with the line speed and dough spacing to cleanly score each roll as it passes by. Based on its initial success, the company purchased additional scoring systems for multiple production locations. (See Case Study 182A.)



### THE BIGGEST CHALLENGE: SPRAYING VISCOUS MATERIALS

Most of the problems associated with traditional viscous coating methods like enrobing and manual ladling systems can be easily addressed with AccuCoat® Heated Spray Systems. Ideal for spraying butter, chocolate, fat barriers, oil, sugar slurry and other viscous coating materials, these automated systems provide precise temperature control from the tank to the target to eliminate waste caused by coatings that are too hot or too cold. Precision delivery cuts waste even more, so you begin saving money from day one.

**9.** A large-scale pastry manufacturer facing the challenge of coating wide strips of dough with melted butter opted for a simple spray system using a manually controlled air atomizing nozzle. Besides resulting in inconsistent spray performance and uneven application, this created a great deal of mist and caused safety concerns. By switching to an AccuCoat Heated Spray System, quality has improved because the coating is now uniform across the entire width of the dough strip. Additionally, with the operator now assigned to other tasks, a material savings of 15% and far less cleanup required, the company is saving CAD\$90,000 per year. (See Case Study 154A.)

**10.** An international manufacturer and distributor of baked goods uses the adhesive powers of corn syrup to ensure its cakes don't slip around inside their packaging during shipping. Originally discouraged from spraying by the syrup's high viscosity, the company assigned three workers to apply the corn syrup to shipping plates by hand. It was messy and the amount of syrup being wasted was very high. By switching to an AccuCoat Heated Spray System with PulsaJet automatic spray nozzles, the company was able to reduce the amount of corn syrup applied per plate from 7 grams to 0.5 grams – while maintaining the benefits of anchoring the cakes to reduce product damage (and customer complaints). The workers also were then available for other tasks. (See Case Study 143A.)

The use of spray technology greatly benefits all types of food processing operations, including bakeries. As illustrated by the sidebars accompanying this paper, the potential exists for even more innovative applications for this versatile, high-tech solution. For more information, visit [www.spray.com](http://www.spray.com) or call 1-800-95-SPRAY.

More information about the AccuCoat Heated Spray System and PulsaJet automatic spray nozzles is available at [www.spray.com/accucoat](http://www.spray.com/accucoat) and [www.spray.com/pulsajet](http://www.spray.com/pulsajet), respectively. To consult with one of our experts, call **1-800-95-SPRAY**.





## MORE BAKERY SOLUTIONS

### HOW PRECISION SPRAY CONTROL WORKS

Spraying Systems Co.'s Precision Spray Control uses PulsaJet automatic spray nozzles and an AutoJet spray controller, with a manifold if appropriate, to provide near-instantaneous variations in flow rates and ensure proper application rates as operating conditions vary. For example, when the line speed changes, the flow rate also changes to automatically maintain the desired coverage.

The AutoJet spray controller controls the flow rate by turning electrically actuated PulsaJet nozzles on and off very quickly. Therefore, a single nozzle can produce a wide range of flow rates, including very low flow that might otherwise require an air atomizing nozzle. At higher flow rates, the cycling can be so fast that the flow appears to be continuous. Because the pressure remains constant, the nozzle's spray angle/coverage and drop size do not change, ensuring precise coverage requirements are met at any rate of flow.

For more information on precision spray control, go to [www.spray.com/psc](http://www.spray.com/psc).



### MORE BAKERY SOLUTIONS

#### CLEANUP, FAST AND THOROUGH

Bakery cleanup is a challenge – it always has been, and always will be. It needs to be done thoroughly and efficiently, but manually cleaning vats and mixers can be tedious and difficult, to say nothing of the associated safety concerns.

In fact, HARPC (Hazard Analysis and Risk-Based Preventive Controls), a provision of the FDA's Food Safety Modernization Act (FSMA), requires processors to identify food safety and adulteration risks and implement and monitor controls to minimize risks. The creation of repeatable processes that can be quantified is encouraged.

Automated TankJet® systems offer bakeries and other food processors reliable cleaning tools and procedures to help meet these regulatory requirements. Fluid-driven and motorized TankJet nozzles, which can be permanently installed or moved from tank to tank, provide repeatable spray action to ensure complete, thorough and quick cleaning of the vat or mixer.

This type of equipment also improves safety by eliminating the need for workers to enter tanks and minimizing their exposure to chemicals. The use of costly cleaning chemicals and water also is reduced.

One leading producer of spices and seasonings installed two TankJet 75 tank cleaning units in opposite corners of its blender to thoroughly clean the interior surfaces of its mixing tanks between batches. This cut the time previously spent manually cleaning with high pressure hoses and brushes – which produced inconsistent results – by more than 75%. That resulted in being able to add an additional batch each shift. The equipment paid for itself in less than a week. (See Case Study 160A.)

**For more information about TankJet cleaning equipment go to [www.tankjet.com](http://www.tankjet.com) and in Bulletin B602C, A Guide to Spray Technology for Bakeries.**



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Experts in Spray Technology

North Avenue and Schmale Road, P.O. Box 7900, Wheaton, IL 60187-7901 USA

Tel: 1.800.95.SPRAY    Intl. Tel: 1.630.665.5000  
Fax: 1.888.95.SPRAY    Intl. Fax: 1.630.260.0842

[www.spray.com](http://www.spray.com)



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