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Experts in Spray Technology

# STRATEGIES TO REDUCE YOUR WATER & CHEMICAL COSTS

The need for global industry to reduce both water and chemical usage is frequently in the news. The food, chemical, petrochemical, primary metal and paper industries are among the world's heaviest water users. Similarly, these industrial sectors consume large volumes of cleaning, coating and lubricating chemicals in their daily operations.

Two key considerations should drive industrial producers to examine every possible avenue to minimize their water and chemical "footprints". First, it's simply the right thing to do. But pursuing greater sustainability in daily operations isn't just good for the environment and for future generations. It can also have a significant positive impact on your bottom line.

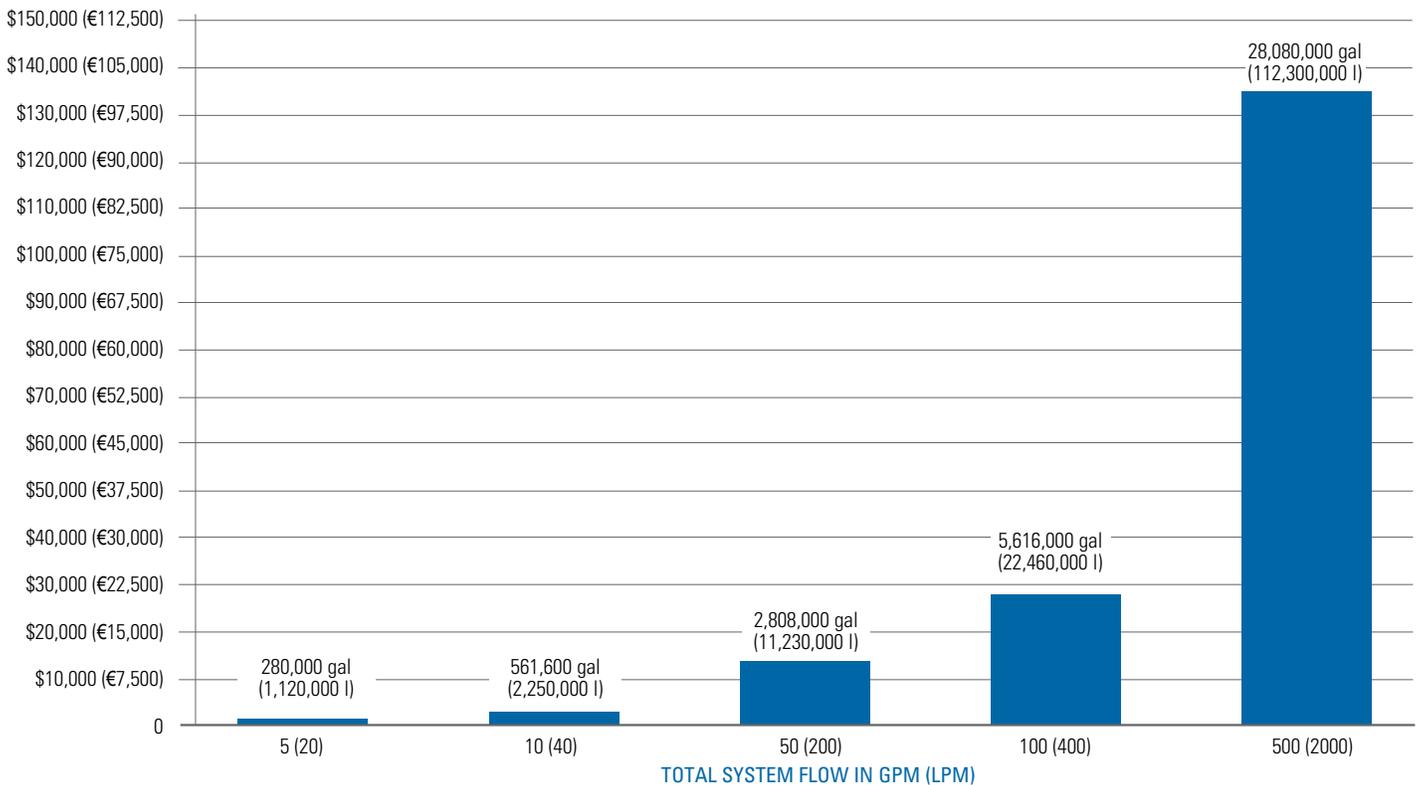
**You may be surprised to learn that often-overlooked spray systems in your plant can waste millions of gallons of water and chemicals each year. That's bad for everyone and you may be surprised at the financial impact of that waste.**



## THE COSTS ASSOCIATED WITH POOR SPRAY SYSTEM PERFORMANCE CAN BE STAGGERING

Spray systems are often perceived as pretty simple. After all, what’s so complicated about pumps, piping and spray nozzles? But the cost of operating a spray system operating at just 15% over designed capacity is significant, as shown below for a range of system flows. Note that these figures are based only on spraying water costing US\$2.75/1000 gallons. The figures do NOT include wastewater disposal costs and total operating costs would be much higher if much more expensive cleaning or processing chemicals were used.

### ANNUAL COST OF WASTED WATER USING A SYSTEM SPRAYING 15% OVER CAPACITY



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

### CONSIDER THESE QUESTIONS:

- **Are you using a spray nozzle to meter liquid flow?** Eliminating open hoses and pipes with holes drilled to create crude spray patterns is the first step to reducing liquid waste.
- **Have you chosen the best spray nozzle?** Eliminating nozzles with excessive liquid flow or those that create misting and overspray is another way to conserve water and chemicals.
- **Can your application benefit from automation?** Using an automatic nozzle for intermittent spraying and adding a spray controller to adjust flow rate is an even more advanced way to improve spray performance.

Technology advances in spray nozzle design and spray system control have enabled many manufacturers and processors to improve their productivity and reduce operating expenses while also reducing their water, chemical and energy use. This paper will provide a framework for how to make these improvements and several examples of the results achieved by processors using these techniques.





## USING SPRAY TECHNOLOGY TO SAVE WATER AND CHEMICALS

To achieve optimal spray performance and keep operating costs as low as possible, be sure to consider your spray system in its entirety and develop a plan for evaluating, monitoring and maintaining it. Following are some guidelines to help ensure you are getting the most from your spray system.

### CONFIRM YOU ARE USING THE RIGHT NOZZLES FOR YOUR OPERATION

If you've been using the same nozzles for a few years, find out if there are newer versions available. Even if you aren't experiencing problems, you may find new nozzle designs are available that offer greater efficiency and longer wear life. New automatic spray nozzles and anti-bearding nozzle designs are two recent advancements in spray technology that can optimize performance in many applications. You should also explore the following options:

- Clog-resistant designs to minimize performance problems and unscheduled downtime
- Quick-connect styles to reduce maintenance time
- Alternate nozzle materials to extend wear life

Remember, the nozzle is the heart of your spray operation. Verifying nozzle selection is the best investment you can make in your spray system.

### ESTABLISH A ROUTINE SPRAY SYSTEM MAINTENANCE PROGRAM

Neglecting your spray system can cost you thousands – even hundreds of thousands – of dollars annually. Even worse, most people don't realize that quality problems and rising operating costs are often due to using worn spray nozzles – components that can easily be replaced at relatively low cost. Spray nozzles, like any precision component, will wear with use causing flow rate to increase and performance to decline.

Visual detection of nozzle wear is nearly impossible unless the wear is very significant. A quick spot check to see if nozzles are spraying often won't reveal the problem. In addition to inspecting individual nozzles, be sure to monitor the performance of your pumps, piping, valves and filtration equipment. All of these components affect the overall performance of your spray system.

### CONSIDER THE VALUE OF AUTOMATED SPRAY CONTROL

Automating your spray operation will often result in liquid savings and dramatic production improvements. A simple automation project such as installing tank cleaning nozzles to eliminate manual cleaning of tanks, totes and processing vessels can pay big dividends.

An automated spray system including a dedicated spray controller is another way to add precision to many operations. Spray control options range from simple systems that provide on/off control and automatic air and liquid control to sophisticated systems that provide closed-loop control of spray operations with automatic adjustments. This type of real-time monitoring of spray performance reduces the need for manual inspection of many systems.

It is important to understand what benefits you may gain from spray control and evaluate the options available. Spray control may sound costly but most users find the investment is offset very quickly by reduced water and chemical costs, increased production, reduced scrap rate and more.





## HOW OTHERS HAVE SAVED

### MEAT PROCESSING PLANT LEARNS HOW TO SAVE ALMOST 57,000 GALLONS (216 KILOLITERS) PER HOUR

A Midwestern meat processor called for some expert advice on how to conserve water in daily operations. More than 40 areas of the plant were evaluated.

#### HERE ARE SOME EXAMPLES OF THE WATER SAVING SOLUTIONS PROVIDED:

##### **Choose Appropriate Nozzles**

Over 35 different nozzle types were being used in the wash cabinets, including bathroom shower heads and other nozzles not designed for washing applications.

**Solution:** Install appropriate nozzles – a combination of 30° full cone nozzles and other high-pressure/high-impact wash nozzles.

##### **Eliminate Leaking Spray Guns**

Spray guns in the skinning room were leaking.

**Solution:** Upgrade to a higher quality gun with a variable spray pattern that allows the operator to optimize the gun's performance.

##### **Eliminate Open Pipes**

In several locations, holes drilled in pipes were spraying without nozzles.

**Solution:** Plug some holes in the pipes and install flat spray nozzles in others to reduce flow and improve performance.

##### **Replace Worn Nozzles**

Though it wasn't clear from a visual inspection, spray testing determined that spray nozzles at the gam table were worn and generating flow that was more than 200% over capacity.

**Solution:** Replace worn nozzles.

##### **Automate Spray Manifold Operation**

Many manifolds throughout the plant sprayed even when the conveyors were shut down.

**Solution:** Add solenoid valves, triggered by conveyor movement, to eliminate unnecessary operation.

### RESULTS:

The solutions provided will save 948 gpm (3,587 l/min). That's 56,862 gallons (215 kiloliters) of water for every hour the plant operates.





**CHEMICAL PLANT REDUCES CONSUMPTION OF HOT WATER BY MORE THAN 4,000,000 GALLONS (15,142 KILOLITERS) PER YEAR**

A chemical processing plant cleaning more than 30,000 totes annually was using 276 gallons (1,045 liters) of 150°F (65.6°C) water to clean each 400 gallon (1,514 liter) tote. The processor realized the cleaning system was cost-prohibitive and sought help.

**Solution:** A new system was designed around a motorized tank washer. It not only uses less water, the new system provides better cleaning in less time.

**RESULTS:**

Each tote is now cleaned with 129 gallons (488 liters) for an annual savings of 4,410,000 gallons (16,694 kiloliters) of hot water per year. In addition, cleaning cycles were reduced from 30 to just 10 minutes per tote, allowing the totes to be returned to service more quickly. The estimated annual cost savings for the water consumption reduction is US\$28,000.

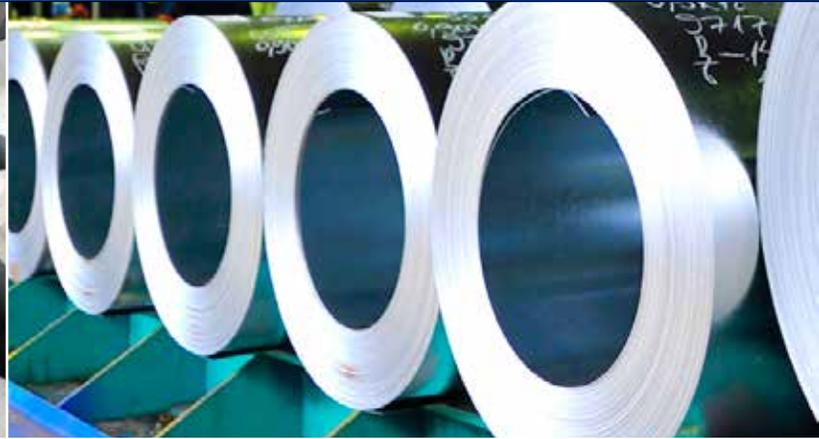
**AUTOMATED SPRAY SYSTEM REDUCES OIL USAGE BY 45% IN BAKERY**

A bakery was using a spinning disk to apply release agent to a 1000mm (39") steel baking band. The distribution of the release agent was uneven and the system could not be adjusted for variations in line speed, which varied up to 15%. The system was wasting release agent and generating excessive mist, which created cleanup problems.

**Solution:** A heated spray system with a dedicated spray controller applies the oil with automatic spray nozzles. The system's header and nozzles are fully jacketed to maintain the desired oil temperature (65°C; 149°F). Spray coverage from the hydraulic nozzles is uniform across the full width of the band and the system maintains a consistent coating weight using automatic line speed adjustments.

**RESULTS:**

Reduced oil use – 30 g/m<sup>2</sup> (0.10 oz./ft<sup>2</sup>) compared to 55 g/m<sup>2</sup> (0.18 oz./ft<sup>2</sup>) – a 45% savings. The new system also eliminated the mist problem.



### **BUILDING PRODUCTS MANUFACTURER REDUCES RELEASE AGENT CONSUMPTION BY 65%**

A manufacturer of concrete building products needed to apply a release agent to molds to prevent concrete shapes from sticking. A spray system coated the molds with release agent as they passed under a spray bar but significant waste was generated because the system operated continuously.

**Solution:** An automated system solved the lubrication challenge. A spray controller adjusts flow to apply a precise volume of release agent into each concrete mold. Accurate intermittent spraying of three automatic spray nozzles ensures that only the molds themselves are coated. Release agent waste is eliminated along with the mess created by spraying between molds. Simple controls enable operators to make quick flow rate adjustments, ensuring uniform coverage of the molds even when the line speed changes.

#### **RESULTS:**

The new system reduced release agent use by 65% while maintaining product quality. The chemical savings offset the spray system purchase price in about 9 months.

### **ALUMINUM MANUFACTURER REDUCES LUBRICANT USAGE BY 45%**

An aluminum manufacturer needed to apply a thin coating of oil on aluminum strip during coil finishing to facilitate forming and to help prevent corrosion. All of the nozzles of the previous spray header operated no matter the width of the strip, wasting oil when narrow strips were processed. In addition, the flow rate of the previous system was constant so oil was often over-applied when line speed slowed.

**Solution:** An automated spray system featuring two spray headers is equipped with automatic spray nozzles which are activated by operators in four spray zones to match the strip width. The system's Precision Spray Control algorithms automatically adjust the flow of oil from the nozzles to accommodate line speeds which vary from 300 to 1200 ft./min. (91 to 366 m/min.).

#### **RESULTS:**

The new spray system has reduced oil consumption by more than 45%, and created a cleaner and safer work environment. Rework on more than 80,000 pounds (36,000 kg) of coils has been eliminated now that over- and under-application of lubricant is no longer an issue. The cost of the system was recouped in less than four months.



**PLASTIC CUP MANUFACTURER SAVES US\$18,000 ANNUALLY ON SILICONE EMULSION USAGE**

A leading manufacturer of plastic cups needed to apply a thin coating of silicone emulsion into the cups after molding. The coating prevents the cups from sticking together during packaging. A PLC-based spray system was previously used but the system’s slow response time resulted in over-application of the release agent and inhibited downstream printing. Frequent system maintenance, poor transfer efficiency and misting which created slippery floors in the production area were additional concerns.

**Solution:** An automated spray system with a 16-gallon (61-liter) pressure tank delivers the silicone emulsion to automatic air atomizing nozzles which spray upward into the molded cups. The automated system is integrated with the machine press to evenly coat the interior surface of each cup as it passes the spray station. The nozzles are mounted in a convenient one-piece channel header positioned below the production line and are equipped with drip-free shut-offs to eliminate mess in the production area.

**RESULTS:**

The automated spray system has reduced consumption of the silicone emulsion by more than 15%, saving the cup manufacturer more than US\$18,000 per year and recouping the system cost in less than a year. Better system control has also eliminated the printing problems caused by over-application of the release agent and reduced scrap. Improved transfer efficiency, accurate intermittent spraying and positive shut-off have improved workplace cleanliness and safety.

**ELASTOMER MANUFACTURER REDUCES RELEASE AGENT USAGE AND SAVES US\$50,000 ANNUALLY**

A manufacturer of emulsion styrene butadiene rubber (ESBR) needed to spray a release agent on a drying conveyor. The previous spray system didn’t apply the release agent evenly across the width of the conveyor and lacked the ability to control flow based on line speed. This resulted in excess use of the release agent, sticking problems on the conveyor and an unsafe production environment.

**Solution:** An automated spray system applies the release agent as a thin, uniform film across the entire width of the stainless steel conveyor. The system’s spray controller uses Precision Spray Control algorithms to produce very low flow rates from the spray header, which is equipped with six automatic spray nozzles. As line speed changes, operators can easily change flow rate of the hydraulic nozzles without changing pressure – maintaining consistent spray coverage and drop size. Because the automatic nozzles use only low pressure atomization, mist and overspray are eliminated.

**RESULTS:**

The automated spray system has reduced release agent usage by 80% and saved the elastomer manufacturer more than US\$50,000 per year – a payback period of less than two months. The consistent application of release agent has also eliminated the previous mess and safety issues.



## CONCLUSION

Reducing your plant's water and chemical footprint is the right thing to do – for both environmental and financial reasons. Experts agree that to ensure the highest possible quality of life for future generations, we must act aggressively now.

Out-of-specification spray systems may cause problems that extend far beyond wasting water or chemicals. Quality control problems, unscheduled production downtime and increased maintenance may all result if your system isn't running properly. By working with a leading spray system manufacturer, these problems can be avoided altogether.

TO SEE MORE EXAMPLES HOW SPRAY SYSTEM OPTIMIZATION HAS IMPROVED OPERATIONS IN A WIDE VARIETY OF INDUSTRIES, SEE:

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

We hope that you will take the necessary steps to minimize water and chemical use in your spray operations.

FOR MORE INFORMATION ON OPTIMIZING PERFORMANCE IN SPRAY OPERATIONS:

[DOWNLOAD OR REQUEST](#)  
OPTIMIZING YOUR SPRAY SYSTEM,  
TECHNICAL MANUAL 410B.

To ensure your system is operating at peak efficiency, begin with an audit of your spray system by a reputable spray system manufacturer. An audit is typically offered at no cost and may require several hours of work.

**To consult with one of our experts, call 1.800.95.SPRAY.**



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White Paper 112 ©Spraying Systems Co. 2016