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Experts in Spray Technology



Spray
Nozzles



Spray
Control



Spray
Analysis



Spray
Fabrication

Change the Way You Spray:

Seven Changes You Can Make that Will Reduce Costs Immediately

By Jon Barber, Spraying Systems Co.

Economic downturns often prompt manufacturers to convert their “cost management” programs into “cost reduction” programs. However, cutting costs can have a negative impact on product/process quality and can lead to high scrap rates, costly product recalls and unhappy customers.

In many operations, opportunities exist to reduce operating costs without compromising quality. Some new equipment may be required, but the resulting cost savings will offset

the purchase price quickly. Spending a few hundred or thousand dollars can often lead to savings of tens or even hundreds of thousands of dollars over the course of a year.

In the sections that follow, you’ll learn about seven changes that can have a significant impact on your bottom line. The recommended changes won’t all apply to every spray operation, but many will. Keep reading to learn how to lower operating costs in cooling, coating, cleaning, sanitizing, lubricating and moisturizing applications.

CHANGE

#1

Eliminate the use of open hoses for clean-up and sanitation. Use hoses with spray guns instead.

Did you know that you can reduce water consumption by as much as 50% by using low-pressure spray guns instead of open hoses? Ensuring that water is “on” only when needed can cut water use in half. It’s a small change that can yield big savings. Here is just one example:

A food processor was using 15 open hoses for sanitation. The hoses were in use eight hours per day, five days per week, 50 weeks per year. 500,000 gallons (1,892 kiloliters) of water were used daily.

Using hoses equipped with spray guns, water use decreased by 30% per hose. Water use dropped by 17,280 gallons per day (65,411 liters).

The processor saved \$30,240 annually on water and disposal costs. The cost of the spray guns was recouped after approximately 30 days of use.

All costs are USD.



CHANGE

#2

Check your nozzles regularly. If they are spraying more than 10% over the rated capacity, replace them.



When was the last time you checked your spray nozzles or took the time to measure the capacity?

If the answer is “never” or “I don’t remember,” you may be surprised at how much that oversight may be costing. Using nozzles that are spraying just 15% over the rated capacity could be adding almost \$200,000 per year to your operating costs.

A quick look at your nozzles will only reveal obvious problems such as clogging, corrosion or damage. Wear of the nozzle orifice isn’t visible but it can be very costly. Here’s just one example:

Nozzles spraying 15% over capacity; total system flow of 100 gpm (379 l/min):

	Gallons (Liters) per year	Cost
Water waste	1,701,835 (6,442,147)	\$4,680
Chemical waste	170,165 (644,145)	\$170,164
Wastewater disposal	1,872,000 (7,086,291)	\$7,956
Total cost: \$182,800		

The cost of increased electricity or pump wear is not included in this example. Water is estimated at \$2.75 per gallon; chemicals at \$1.00 per gallon with a 10:1 dilution ratio and the system is in operation 2,080 hours per year. This is a conservative estimate and is based on one spray system.

Most plants have many spraying operations so \$182,800 in waste could easily become \$500,000 or \$1,000,000 if multiple systems are in use.

You can prevent this waste from occurring. Measuring flow rate is a quick and easy process and well worth the small effort required.

If you are using centrifugal pumps:

- Monitor flow meter readings to detect increases. Or, collect and measure the spray from the nozzle for a given period of time at a specific pressure
- Then, compare these readings to the flow rates in the manufacturer’s catalog

If you are using positive displacement pumps:

- Monitor the liquid line pressure for decreases. The flow rate will remain consistent

The cost to replace nozzles is usually far less than continuing to use worn nozzles. It is recommended that you do a simple analysis like the one above, determine the cost to replace nozzles and pre-determine a replacement interval. Most users elect nozzle replacement when nozzles are spraying 10 to 15% over capacity.

CHANGE

#3

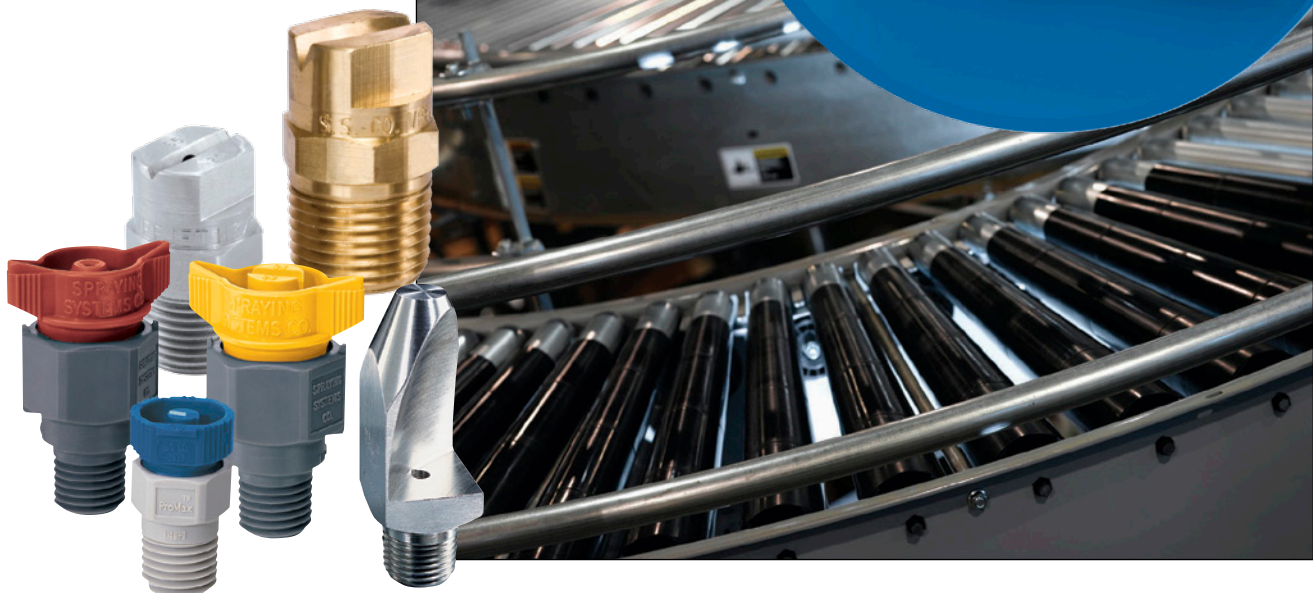
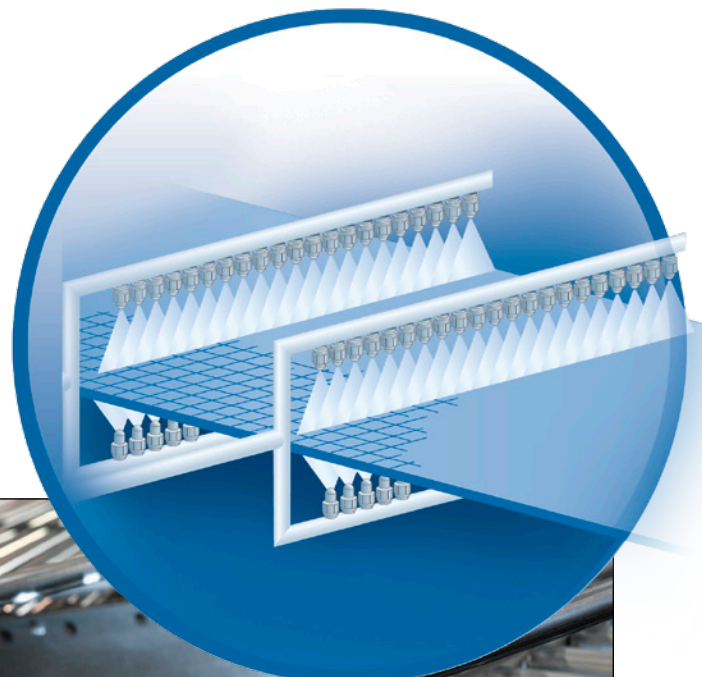
Automate conveyor cleaning.

Installing spray manifolds above and below conveyors can save hours of labor and thousands of gallons of water and cleaning chemicals. Automating conveyor cleaning also enables workers to be deployed to other projects.

Manifolds are typically equipped with flat spray nozzles to cut through debris and sticky buildup. Nozzles are positioned to ensure cleaning of the entire belt width and edges. Full cone nozzles with extra large free passage are often used

to minimize clogging when recirculated water is used for cleaning. A basic spray controller can be used for precise on/off control, activate cleaning cycles based on pre-determined schedules and ensure nozzles are only spraying when needed.

The specifics of your application will determine how much you can save by automating conveyor cleaning, but **most processors report water and chemical reductions in the 50 to 60% range.**



CHANGE

#4 Add headers/manifolds to reduce maintenance time and ensure long nozzle life.



Enclosing nozzles in a header or manifold is a simple, cost-effective way to minimize maintenance downtime and extend nozzle life.

If you've ever struggled with connecting air and liquid lines or been faced with a tangled mess of tubes, you will immediately understand the value manifolds can bring to your operation. Set-up and maintenance time can go from hours to minutes and result in increases in production time. Downtime due to performance problems caused by bends or kinks in the tubing is eliminated and the added protection of the manifold keeps nozzles operating at peak efficiency longer.

There are many types of manifolds readily available:

- Channel manifold: Basic spray nozzle manifold incorporated in a C-channel for easy mounting and maintenance
- Pipe-in-pipe manifold: Conventional spray manifold mounted inside a slotted pipe to protect nozzles from the external environment. Nozzles and tubing are enclosed in the manifold
- Modular manifold: Lightweight and easy-to-assemble, this manifold keeps tubing organized
- Compact manifold: Service nozzles while keeping tubing in place with lightweight, compact manifolds

Manifolds are available for both hydraulic atomizing and air atomizing nozzles. The cost for standard manifolds is typically low and easily recouped.



Channel Manifold



Pipe-In-Pipe Manifold



Modular Manifold



Compact Manifold

CHANGE #5

Add spray control.

If variations in your spray operations affect the quality of your product or process, you can reduce your operating costs by adding a spray controller. Adding spray control usually yields these benefits:

- Reduced use of costly chemicals, water and energy
- Reduced manual operation and monitoring, freeing workers for other tasks
- Reduced maintenance time by minimizing or eliminating overspray and misting
- Reduced scrap through improvements in quality
- Reduced downtime for set-up and batch changes

There are many spray control options available:

- Fluid delivery systems that include standard pump and motor sets provide can optimize the performance of a wide range of nozzles including tank cleaning nozzles
- Basic spray controllers provide precise on/off liquid and air control for automatic spray nozzles
- More sophisticated controllers provide advanced timing control to optimize the performance of automatic spray nozzles, electronically monitor pre-set spray variables in real-time and offer advanced fault monitoring to alert operators to problems. Some can be pre-programmed to monitor and automatically adjust spray performance based on process variables such as conveyor speed, temperature and batch control
- Fully automated systems are available for advanced spray operations such as gas cooling, lubrication, panel board spraying, antimicrobial application, coating with viscous fluids and more.

Reductions in operating costs will obviously depend on your spray application and the level of spray control selected. Often, the cost of adding spray control or a fully automated system can be recouped in just a few months.

Here are just a few examples of how manufacturers are using spray control to lower operating costs:



Meat processors are applying precise doses of antimicrobials onto meat and/or into packaging prior to vacuum sealing. A spray controller uses a trigger signal from an indexing conveyor to activate the spray. Chemical consumption is dramatically reduced without compromising food safety

Bakery and snack food manufacturers coat conveyors with grease to prevent products from sticking to the belts. Instead of pouring grease on the conveyors, a simple automated system is used to pull grease directly from a container and coat the conveyor uniformly without any waste or mess. Considerably less grease is used and downtime for maintenance to clean up the excess lubricant is eliminated

Manufacturers of engineered wood products use automated spray systems to apply release agents to boards and conveyors during processing to prevent boards from sticking to belts, variations in board thickness and bursting. The even application of the release agent has resulted in scrap reduction by as much as 95% and release agent consumption has been cut by at least 50%



CHANGE

#6 Replace open pipe with air nozzles or air knife packages for drying or blow-off.

If you're using pipe with drilled holes or slits for drying or blow-off, you're wasting costly compressed air.

Installing air nozzles will reduce your air consumption up to 36%. Changing to air knives powered by regenerative blowers will eliminate the need for compressed air entirely. Both of these alternatives will not only lower your operating costs, you may find products are dried more thoroughly or moved more accurately.

Air nozzles convert a low-pressure volume of compressed air into a targeted, high-velocity, concentrated air stream or flat fan/curtain of high impact air. Air nozzles come in a variety of types, capacities, sizes and materials.

Some drying and blow-off operations are well suited to using regenerative blowers and air knives. Air knife/regenerative blower packages are ideal for large areas – more than 2' (61 cm) – and are rugged, reliable and low maintenance.

The savings you can experience by changing to air nozzles or air knife packages can be significant and the cost of new equipment is quickly offset. You could make the example a chart. Here's a typical example*.

Length	Pipe gap/air knife slot	No. of pipes/ nozzles/knives	Blower HP	Pressure	Cost of operation
4' (1.2 m)	1/8" (3.2 mm)	1	–	60 psi (4 bar)	\$356,281
4' (1.2 m)	–	24	–	45 psi (3 bar)	\$24,427 A savings of \$331,854
4' (1.2 m)	.040" (1 mm)	1	15HP	–	\$3,620 A savings of \$352,661

*Example is based on 4,160 hours of operation and \$.07 KWh for energy. Note that air nozzles provide comparable impact at 45 psi (3 bar) to pipes with slits at 60 psi (4 bar). All costs are USD.

In many operations, recouping the cost of air nozzle manifolds takes just a few weeks. Recouping the cost of an air knife package with blower will take a little longer, but you can still count on a quick payback and significant annual savings.



CHANGE

#7

Automate cleaning of tanks, totes, vats and vessels.

If tank cleaning in your facility involves filling and draining or manual cleaning, there's an unnecessary profit leak in your plant. There are dozens of ways to automate cleaning of tanks of all sizes and all of them will significantly reduce:

- Cleaning time
- Manual labor
- Water, chemical and energy use
- Wastewater disposal costs

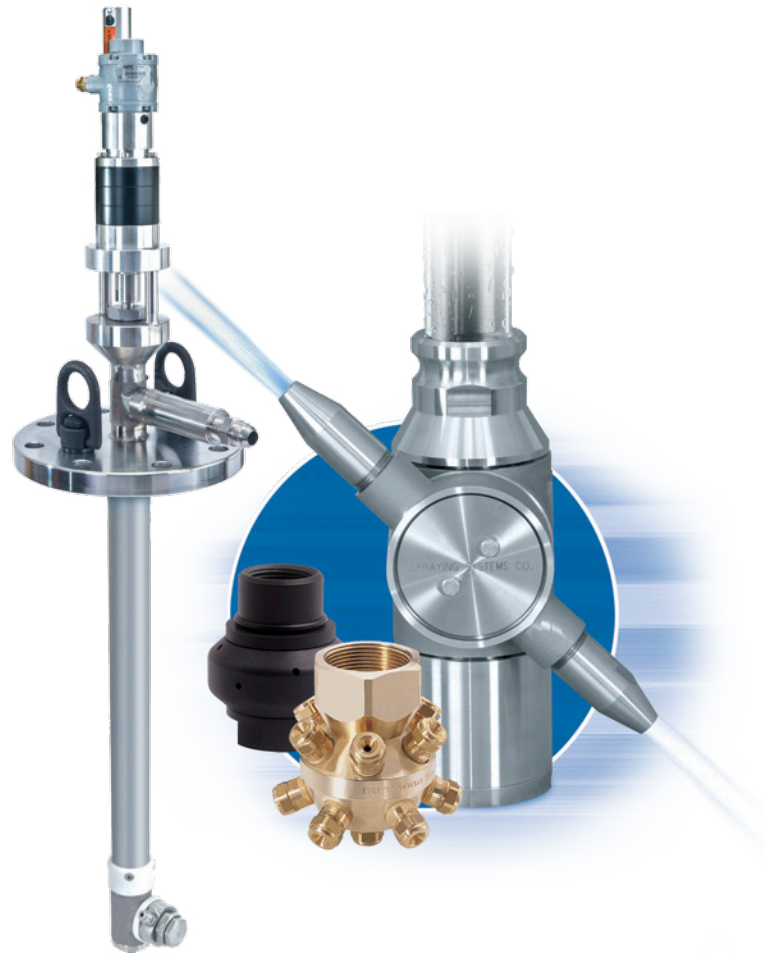
Tanks will be cleaner and returned to service more quickly enabling increases in production time. Operating costs will be lower and profits will be higher.

Savings of \$50,000 per tank aren't uncommon. Most plants have multiple tanks, so it is easy to see how automating cleaning of multiple tanks can save hundreds of thousands of dollars per year by reducing operating costs and increasing production time.

Selecting the right automated tank cleaning product primarily depends on:

- Tank size
- Level of impact required to remove the residue in the tank
- The chemicals used for cleaning and the temperature of the cleaning liquid

Options include spray balls, stationary tank cleaning nozzles, high-impact fluid-driven units, motorized tank cleaners and fully automated tank cleaning systems. Ask your tank cleaning equipment supplier for a no-obligation on-site evaluation to determine which solution is best for your application and to provide a pay-back analysis. The evaluation is usually free and is an efficient way to get the automation process started.



Change The Way You Spray

For more information about how you can change the way you spray and save, contact Jon Barber at 630-665-5000. He'll be glad to provide more information on the seven changes described in this paper or direct you to a specialist based on your spray operation.



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