



## Guide to Spray Systems for Dust Control



# Efficient, Effective Solutions for Dust Prevention and Suppression

Finding the best dust control solution for your operation depends on many factors:

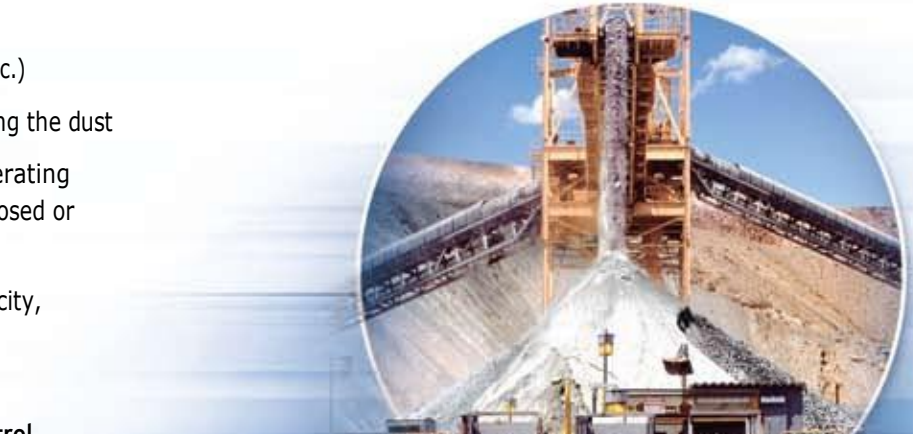
- The material producing the dust (coal, ore, etc.)
- The mining or processing operation generating the dust
- The physical location of the operation generating the dust (underground or above ground, enclosed or exposed areas, etc.)
- The available utilities and resources – electricity, compressed air, water, labor

There are many options available for dust control, but there are four basic approaches:

- Using wet systems that use water sprays to prevent dust or capture airborne dust
- Using enclosures to contain dust
- Using ventilation systems/exhaust systems to remove dust
- Using a combination of these techniques

This guide focuses exclusively on wet systems that use spray systems to control dust. In many environments, the use of water sprays is preferred because:

- It is highly effective
- It is often more economical than other technologies
- Implementation is typically fast and straightforward
- It is a long-term solution that can provide years of trouble-free performance with regular maintenance



**There are many variables to consider when specifying a spray system for dust control:**

- Dust particle size
- Spray drop size
- Spray pattern
- Spray angle
- Operating pressure
- Surface wetting
- Nozzle placement
- Water quality and availability
- Control options

These, and many other factors, can have a significant impact on performance.

Working with a single supplier who is an expert in all facets of spray systems is the best way to ensure optimal dust control. We're uniquely qualified to be that supplier.

**We have:**

- A complete range of product solutions:
  - Spray nozzles
  - Accessories
  - Spray bars/headers
- Automated spray controllers and systems
- Decades of experience with dust control in a wide range of industries
- A global sales organization dedicated exclusively to spray systems.
- A strong commitment to improving the environment

This bulletin is designed to increase your understanding of how to use spray systems for dust control and provide specific information you can use when specifying, operating and maintaining your spray system. Should you need additional assistance, do not hesitate to contact us. Our technical experts are always available for consultation.

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# Wet Dust Control System Fundamentals

Wet systems are used for:

- **Dust prevention:** Humidity/moisture content in the material is increased to prevent dust from becoming airborne
- **Dust suppression/capture:** Humidity/moisture is added to the air to capture dust particles that are already airborne

These systems use spray nozzles to apply water and/or chemicals such as wetting, foaming and binding agents to dust particles. However, the system configuration varies depending on the goal – dust prevention or airborne dust suppression. Most operations require both prevention and suppression to effectively control dust. See Figures 1, 2 and 3. It is important to understand the differences between prevention and suppression systems to ensure proper spray nozzle specification and operation.

## Typical Operations

**Operations requiring dust prevention:**

- Dumping
- Transport
- Transfer points
- Stockpiling/reclaiming

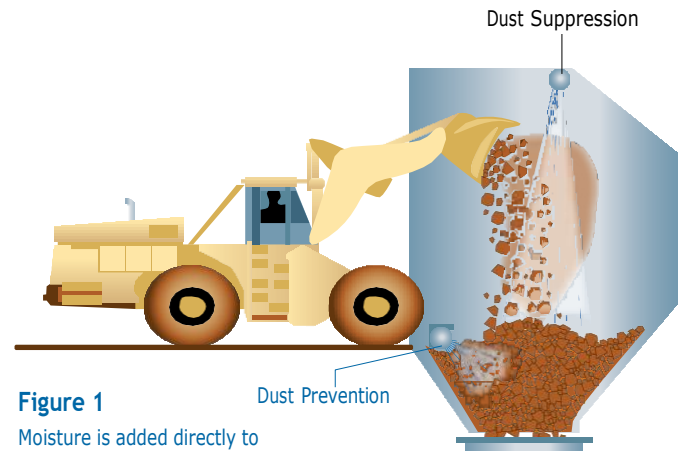
In these operations, moisture can be applied to the material when it is stationary or moving or both.

**Operations requiring airborne dust suppression:**

- Conveying
- Shearing
- Continuous mining
- Crushing and screening
- Dryers
- Transfer points
- Packaging/filling

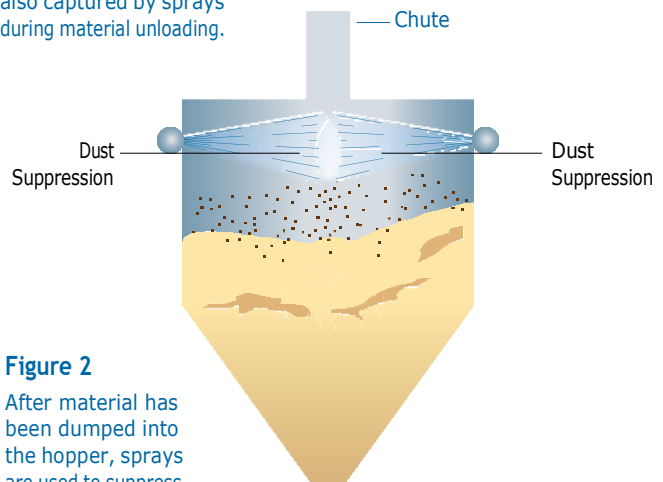
Nozzles produce drops to collide with dust particles that are already airborne. The moisture weighs the particles down so they are returned to the material source or ground.

As discussed previously, both dust prevention and dust suppression may be required. The type of system will depend on the dust source and the stage in the processing operation.



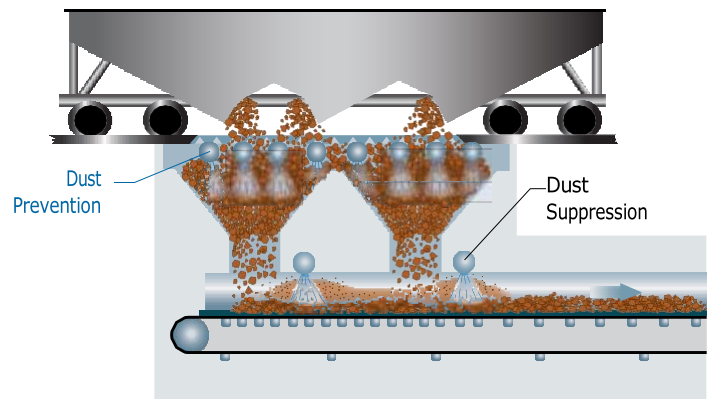
**Figure 1**

Moisture is added directly to the material to prevent dust from becoming airborne. Airborne dust particles are also captured by sprays during material unloading.



**Figure 2**

After material has been dumped into the hopper, sprays are used to suppress the airborne dust.



**Figure 3**

Moisture is added to the material to prevent dust as it is transferred from the hopper car to the hopper bin. Sprays are also used to capture airborne dust as the material moves down the conveyor line.

## Start with These Key Considerations

Fundamentally, wet dust control systems are the same – all use water sprays. However, that’s where the similarities end. System configuration starts by answering a few critical questions.

### If you need to prevent dust:

#### What material are you adding moisture to?

Materials will respond to moisture differently. It is important to understand exactly how much moisture to add. Too little moisture means you’ll still have a dust problem. Too much moisture and the integrity of the material may be compromised and quality issues will result. For example, when applying moisture to ore, adding one gallon per ton provides adequate wetting and does not cause process and production problems. Too much moisture also means sludge and mud and frustrating, costly and potentially dangerous maintenance problems.

The material will also determine whether chemicals should be added to the water to improve suppression and/or lower overall application costs. Coal, for example, repels water and usually requires the use of chemical additives to increase absorption.

Also, consider the processing stage. Most dust particles created during breakage are not released into the air. The dust stays attached to the surface of the broken material. Adequate wetting is critical to ensure dust stays attached. Keep in mind that partially processed minerals and coal may be more sensitive to moisture than unprocessed material.

#### Is the material moving or stationary?

Drop size and spray angle can affect surface coverage when spraying stationary material.

Drop size and drop velocity affect coverage when spraying moving material. These factors must be considered when selecting and positioning spray nozzles.

### If you need to capture airborne dust:

#### What is the particle size of the dust?

Dust capture is most effective when dust particles collide with water drops of an equivalent size. (See page 8 for drop size information.) Drops that are too large won’t collide with the smaller dust particles and drops that are too small evaporate too quickly and release the captured dust particles. See Figure 4. Understanding the particle size of the dust is critical in effective system design.

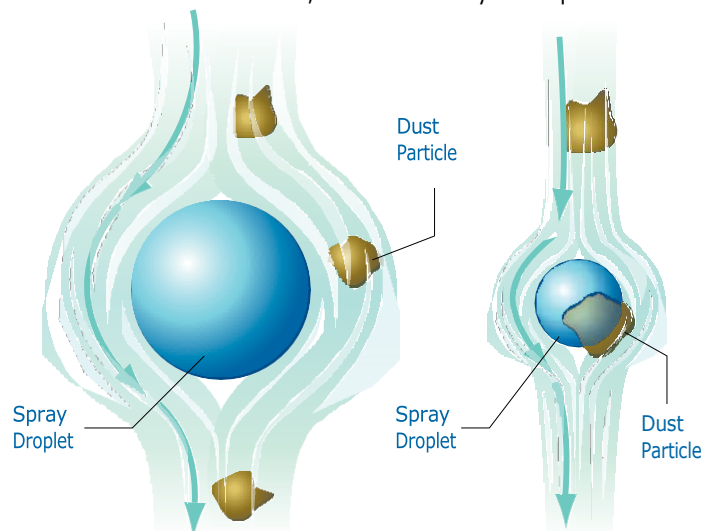
You can use these general guidelines regarding dust particle size. However, further research may be necessary depending on the material and stage of the material in processing.

Particle diameter in microns:

- Ground limestone: 10 to 1000  $\mu\text{m}$
- Fly ash: 10 to 200  $\mu\text{m}$
- Coal dust: 1 to 100  $\mu\text{m}$
- Cement dust: 3 to 100  $\mu\text{m}$
- Carbon black: 0.01 to 0.3  $\mu\text{m}$
- Pulverized coal: 3 to 500  $\mu\text{m}$

#### Where is the dust?

Capturing airborne dust with water sprays is most effective in areas with little air turbulence. Depending on the environment, enclosures may be required.



**Figure 4**

If the drop diameter is larger than the dust particle diameter, the dust particle will follow the air stream around the drop. (Shown left.) If the diameters of the drop and the dust particle are comparable, the dust particle will follow the air stream and collide with the drop. (Shown right.)

# Wet Dust Control System Fundamentals

## General Wet Dust Control Considerations

### Will the dust be returned to the product stream?

If so, the degree of wetting is especially important to avoid quality problems.

### Is rollback dust a problem?

Rollback dust usually comes from under the dumping mechanism on front-end loaders, crushers, grinders, cutting heads and entrances to scrubbers. Rollback dust can be a significant problem and may require a separate system for suppression.

### What is the quality of the water?

Poor quality water can be very problematic in many dust control applications. Strainers may be required – even when using a clean water supply because contaminants can be introduced to the water from eroding pipes. Poor water quality will also require more frequent nozzle maintenance, increase the nozzle wear rate and shorten service life.

### Where will the system be installed?

If freezing temperatures are possible, heaters and floor drains should be considered. Spray equipment may need to be winterized.

If wind is a factor, nozzles that produce larger drops are better able to resist drift and should be used.

### How important is water conservation?

Water conservation is no longer optional in most areas. It is important to specify nozzles that minimize overspray and water waste.

Controls should be used to ensure the system is active only when needed. Many options are available, ranging from simple solenoid valves for on/off control to sophisticated spray controllers that monitor a wide range of operating conditions and make automatic adjustments.

### Is compressed air available?

Air atomizing nozzles mix fluid and compressed air to produce very small drops. Small drops evaporate quickly and are desirable for use in operations where wetting is needed but excess moisture cannot be tolerated. Small drops are also required when capture of small airborne dust particles is required.

### What is the spray solution?

- Plain water systems are typically the least expensive and easiest to design and implement
- Adding surfactants to water will lower the surface tension and allows better interaction between water and certain types of dust that resist water absorption
- Foam systems use less water but usually require compressed air
- Binders agglomerate particles together after the moisture evaporates. However, binders can cause clogging and build-up on nozzles, conveyors and other equipment. Water-soluble binders can cause environmental problems should run-off occur

Figure 5 compares the advantages and disadvantages of various solutions.





Figure 5  
Advantages and Disadvantages of Various Solutions

	PROS	CONS
<b>Plain water</b>	<ul style="list-style-type: none"> <li>• Least expensive</li> <li>• Simple to design and operate</li> <li>• Limited carryover effect is possible</li> <li>• When good mixture of water and material is possible, quite effective</li> <li>• Enclosure tightness isn't critical</li> </ul>	<ul style="list-style-type: none"> <li>• Can't use with products that can't tolerate excess moisture</li> <li>• Some materials repel water</li> <li>• Can't use if freezing temperatures are possible</li> <li>• Requires large volumes of water and overwetting is common</li> <li>• Water evaporates - reapplication is necessary</li> </ul>
<b>Surfactants</b>	<ul style="list-style-type: none"> <li>• Dust control efficiency can be higher than plain water</li> <li>• Equivalent efficiency may be possible using less water</li> </ul>	<ul style="list-style-type: none"> <li>• Not all materials tolerate surfactants</li> <li>• Material is contaminated with surfactants</li> <li>• Higher capital, operating and maintenance costs</li> </ul>
<b>Foam</b>	<ul style="list-style-type: none"> <li>• Best efficiency when effective mixing of foam and material can be achieved</li> <li>• Moisture addition is low</li> </ul>	<ul style="list-style-type: none"> <li>• Material is contaminated with foam</li> <li>• Compressed air is usually required</li> <li>• Higher capital, operating and maintenance costs</li> </ul>
<b>Binders</b>	<ul style="list-style-type: none"> <li>• Eliminates the need for re-application</li> <li>• Best efficiency in multiple transfer points</li> </ul>	<ul style="list-style-type: none"> <li>• May cause production problems and nozzle/equipment damage</li> <li>• Higher capital, operating and maintenance costs</li> </ul>

# Guidelines for Spray Nozzle Selection

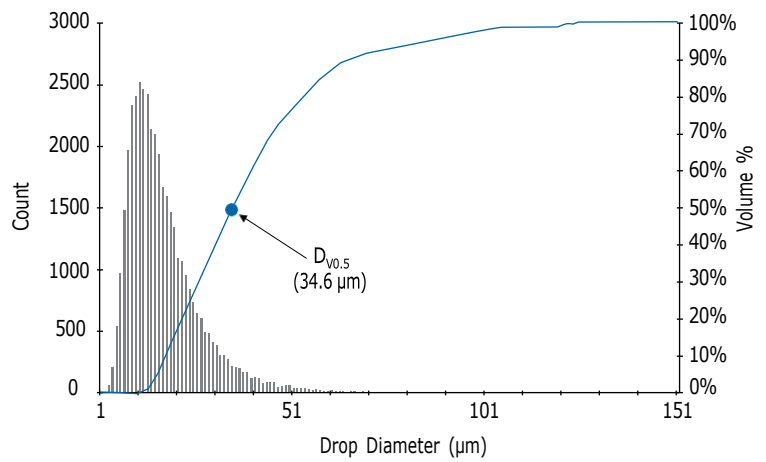
Spray nozzle specification depends on many factors. General guidelines follow. However, it is recommended that you contact a firm specializing in spray systems to ensure you get the performance you need for your specific environment and operating conditions.

## Start By Understanding the Role of Drop Size

Drop size refers to the size of the individual drops that comprise a nozzle's spray pattern. Each spray pattern provides a range of drop sizes. This range is the drop size distribution. See Figure 6.

Many factors can affect drop size: liquid properties, nozzle capacity, spray pressure and spray angle.

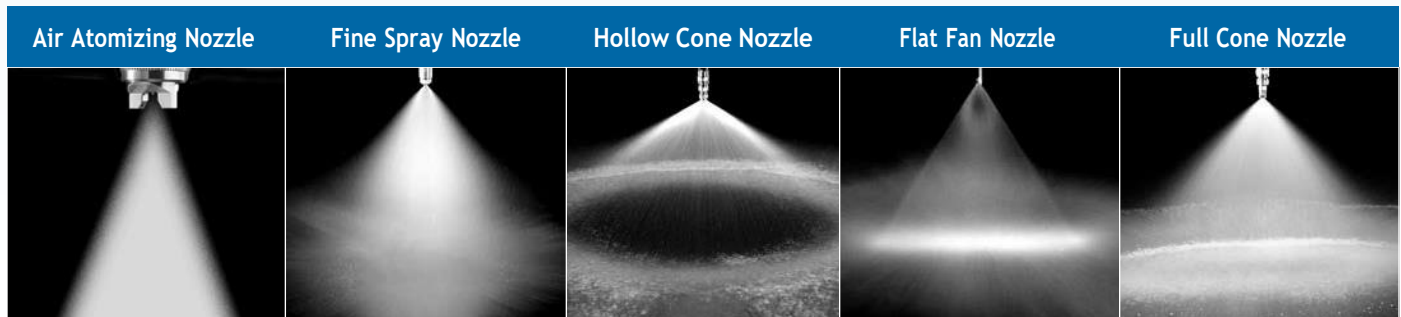
Figure 6



$D_{v0.5}$  is the Volume Median Diameter, which is also known as VMD or MVD.  $D_{v0.5}$  is a value where 50% of the total volume of liquid sprayed is made up of drops with diameters larger than the median value and 50% smaller than the median value.

## Drop Size Basics

- Air atomizing nozzles produce the smallest drop sizes followed by fine spray, hollow cone, flat fan and full cone nozzles
- Higher pressures yield smaller drops and lower pressures yield larger drops
- Lower flow nozzles produce the smallest drops and higher flow nozzles produce the largest drops
- Increases in surface tension increase drop size
- Drop velocity is dependent on drop size. Small drops may have a higher initial velocity, but velocity diminishes quickly. Larger drops retain velocity longer and travel further



Smallest  
Drop Size

Largest  
Drop Size





## Nozzle Types: Hydraulic Atomizing vs. Air Atomizing

In most operations, drops less than 200  $\mu\text{m}$  do a better job of suppressing airborne dust particles, which are also very small. Atomization shears the water into very small particles, reducing surface tension and increasing the number of drops in a given area.

Atomization is achieved by pumping water through nozzles at high pressure or by using a combination of compressed air and water pumped at lower pressure to produce very small drops or fog. Using air atomizing nozzles is usually preferable since they produce smaller drops. However, the cost of installing and operating compressed air may be prohibitive in some operations. Hydraulic fine spray nozzles are widely used and yield acceptable performance in many operations. See Figure 7 for comparison matrix.

Figure 7

### Hydraulic Fine Spray vs. Air Atomizing Nozzle Comparison

NOZZLE TYPE	PROS	CONS
 <p><b>Hydraulic Fine Spray</b> (Wall-Mount)</p>	<ul style="list-style-type: none"> <li>• Simple installation</li> <li>• Lower operating costs - no compressed air required</li> </ul>	<ul style="list-style-type: none"> <li>• Operating at high pressures increases electrical consumption and increases pump wear</li> <li>• Water quality is critical. Small orifices are prone to clogging by small contaminants</li> <li>• Best used in enclosed areas with little turbulence</li> </ul>
 <p><b>Air Atomizing</b></p>	<ul style="list-style-type: none"> <li>• Smaller drop size</li> <li>• Larger flow passages and less clogging</li> </ul>	<ul style="list-style-type: none"> <li>• Expense of compressed air</li> <li>• Possibility of injecting additional air into the area - increased velocity could stimulate additional dust movement</li> <li>• Best used in enclosed areas with little turbulence</li> </ul>

For dust prevention, standard hydraulic nozzles that produce drops between 200 and 1200  $\mu\text{m}$  are generally used.

For suppression of airborne dust, air atomizing nozzles or hydraulic fine spray nozzles that produce drops between 20 and 200  $\mu\text{m}$  are used. Figure 8 illustrates the effectiveness of airborne dust suppression by nozzle type.

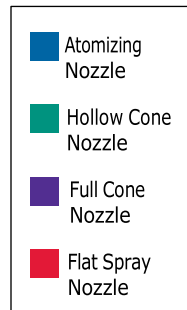
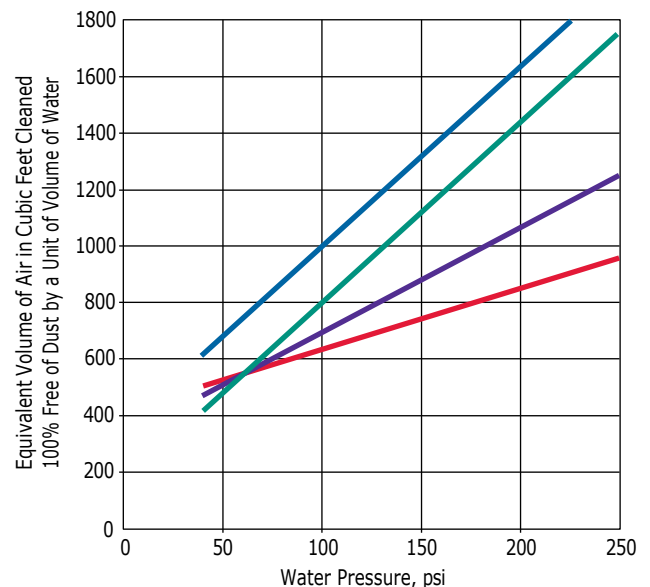


Figure 8



# Guidelines for Spray Nozzle Selection

## Spray Pattern Selection

Operating conditions will determine which nozzle style and spray pattern will offer the best performance. These guidelines provide an overview that can help you narrow the options, but be sure to consult performance tables and drop size data to refine your selection. Figure 9 provides an overview of typical operations for many nozzle types.

### Hollow cone nozzle features:

- Circular ring of water
- Large nozzle orifices that reduce clogging
- Small drop size – generally smaller than other nozzle types
- Typically used in locations where dust is widely dispersed
- Most widely used for dust prevention



**B and BD WhirlJet®**  
hollow cone nozzles

### Flat spray nozzle features:

- Tapered-edge, rectangular or even spray pattern
- Small- to medium-size drops
- Typically used in narrow or rectangular enclosed spaces
- Widely used for dust prevention



**VeeJet®**  
flat spray nozzle

### Full cone nozzle features:

- Round spray pattern
- High velocity over a distance
- Medium- to large-size drops
- Commonly used when nozzles must be located a good distance away from the area where dust suppression is needed or to clear mechanical obstructions
- Widely used for dust prevention



**FullJet®**  
full cone nozzle

**Air atomizing nozzle features:**

- Choice of spray patterns - round, full and flat
- Very small drops
- Commonly used to capture small dust particles in enclosed areas to minimize drift
- Widely used for airborne dust suppression



**Hydraulic fine spray nozzle features:**

- Hollow cone spray pattern
- Very small drops
- Commonly used to capture small dust particles in enclosed areas to minimize drift
- Widely used for airborne dust suppression and operations requiring a light fog



Figure 9

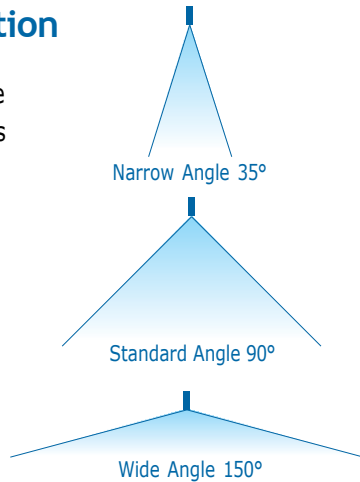
**Typical Applications by Spray Nozzle Type**

Application	Air Atomizing	Hydraulic Fine Spray	Hollow Cone	Flat Spray	Full Cone
<b>Dust Prevention</b>					
Stackers, reclaimers		•			•
Stockpiles		•		•	
Transfer points		•	•		•
Transport areas/roads			•		
<b>Airborne Dust Suppression</b>					
Jaw crushers	•	•	•		
Loading terminals	•	•			
Primary dump hopper	•	•			
Transfer points	•	•			

# Guidelines for Spray Nozzle Selection

## Spray Angle Selection

The spray angle of the nozzle is application-dependent. It is dependent on the spray pattern, the number of nozzles used and nozzle placement. Spray angles range from 0° to 175°.



## Operating Pressure

The ideal operating pressure is dependent on many application-specific variables. However, these basic principles should help you decide.

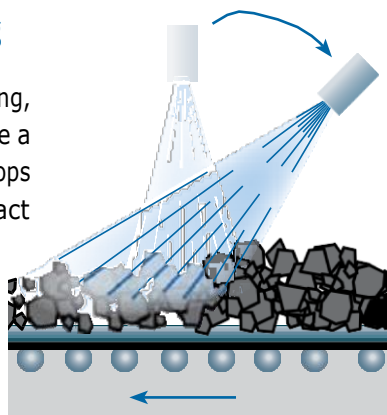
- Increasing pressure decreases drop size
- High pressure sprays are better suited for enclosed areas
- Nozzles operating at higher pressures should be placed close to the dust source to minimize the amount of air set in motion along the spray path

## Surface Wetting

To increase surface wetting, use nozzles that produce a large number of small drops and decrease the contact angle of the spray on the material.

Impact can also increase surface wetting. Impact can be increased by increasing operating pressure. Keep in mind

that drops normally travel through turbulent air before they hit the material. Friction drag of air reduces the impact velocity as the water travels away from the nozzle orifice.

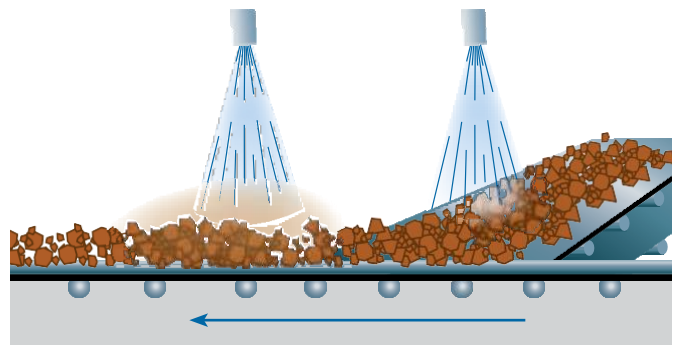


Decrease the contact angle of the spray on the material as shown here to increase surface wetting.

## Nozzle Placement at Transfer Points

Nozzles being used for dust prevention should be placed as close to the beginning of the transfer point as possible. The force of the moving material helps the water penetrate the material as it moves through the transfer point.

Nozzles in airborne dust suppression systems treat the air around the material rather than the material. These nozzles are generally placed at the end of transfer points so the material load can settle and are positioned so they are spraying above the material and not on it.



Position nozzles at the beginning of the transfer point for dust prevention. Position nozzles to spray the air above the material at the end of the transfer points to suppress airborne dust.

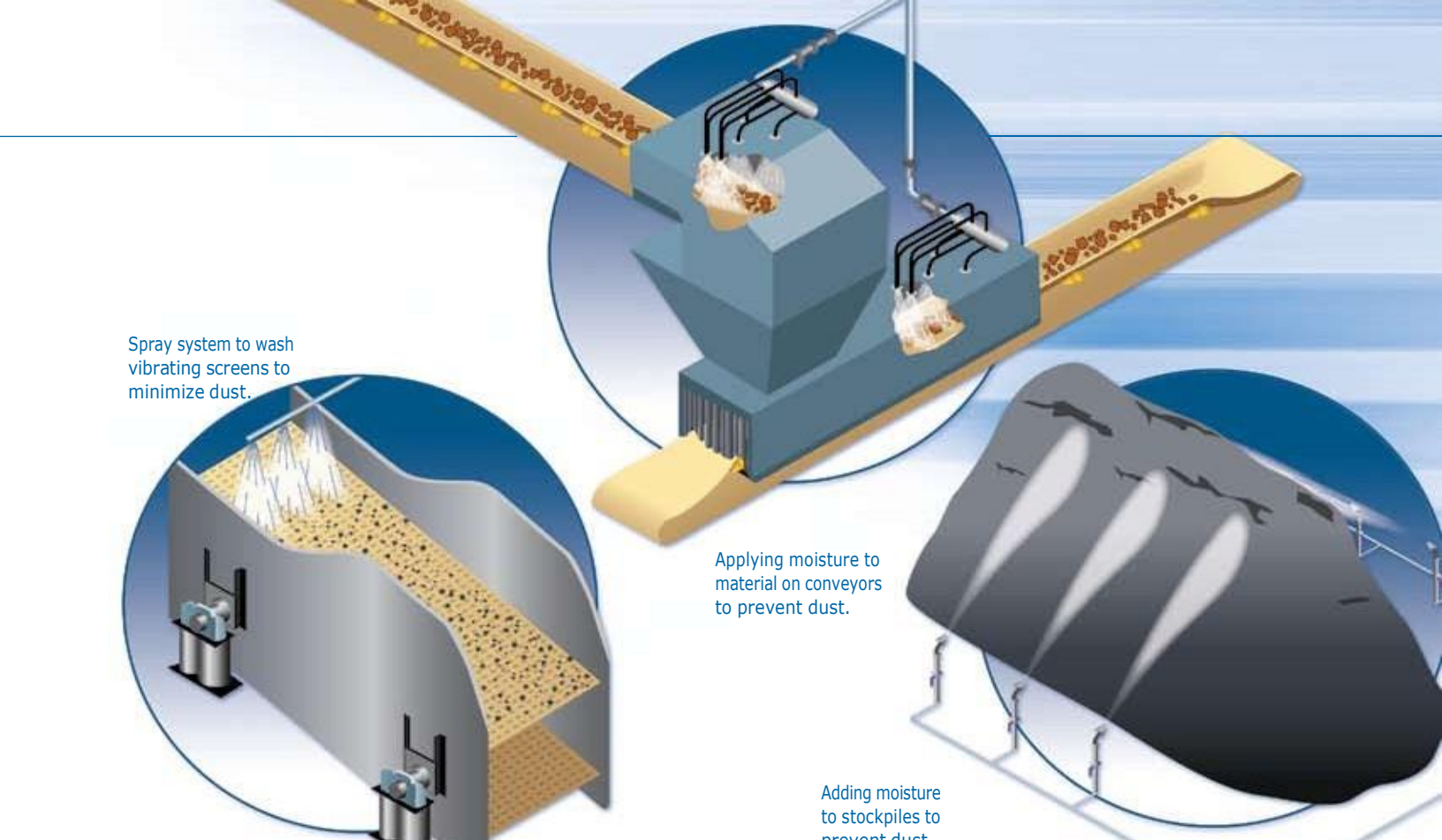
## Additional considerations:

- Keep nozzles out of the range of equipment or falling debris that could cause damage
- Be sure nozzles are accessible for maintenance
- The precise placement of nozzles will depend on many factors. Consult with your nozzle supplier for recommendations

## Water Quality

Water hardness increases the surface tension of water and may increase the amount of water needed for adequate wetting.

Contaminants in the water source may influence the nozzle selection process. If water contains debris, consider using maximum free passage nozzles and/or filtering water to less than 50% of the maximum free passage size of the nozzle to minimize clogging and excessive nozzle wear.



Spray system to wash vibrating screens to minimize dust.

Applying moisture to material on conveyors to prevent dust.

Adding moisture to stockpiles to prevent dust.

## Controlling your Dust System

There are many ways to monitor and control wet systems. The options range from simple, manually-operated systems to more sophisticated automated systems.

Basic on/off operation can be achieved using solenoid valves to ensure sprays are only in use when needed. However, it is important the sprays provide adequate coverage. For example, at transfer points, the system needs to spray for a bit after the material transfer is complete to ensure adequate capture time when the dust is airborne.

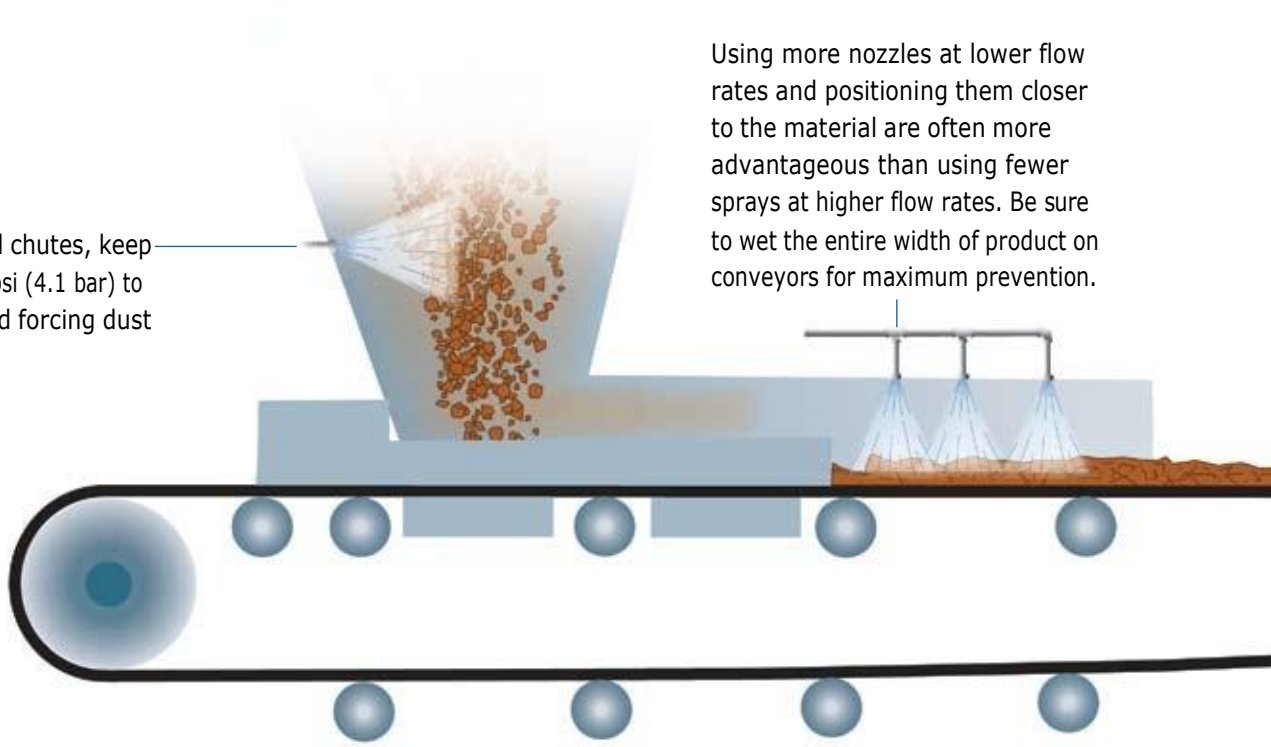
Total system automation can be achieved by using a turnkey spray system. These systems monitor operating conditions using sensors as needed to detect material motion, chemical/water usage, temperature, humidity, conveyor speed and more. The sensors send data to the spray controller. Based on pre-stored logic, the spray controller automatically adjusts the performance of all other system components including pumps, nozzles and other electrical and pneumatic devices. If the controller is unable to make the necessary adjustments or clogged nozzles are detected, alarms are sounded for operator intervention.

### Automated systems yield many benefits:

- More precise spraying – the proper amount of fluid is sprayed for the exact time required
- Proper wetting is ensured
- Water, chemicals such as polymers and surfactants, foam and electricity consumption are controlled and typically reduced
- Workers no longer need to monitor spraying and can be redeployed to other tasks
- Controlled spraying reduces overwetting and eliminates time-intensive maintenance problems
- Production time is increased since maintenance time is decreased

## Spray Optimization Tips for Dust Control

In operations using feed chutes, keep water pressure below 60 psi (4.1 bar) to avoid pressurization and forcing dust from the enclosure.



Using more nozzles at lower flow rates and positioning them closer to the material are often more advantageous than using fewer sprays at higher flow rates. Be sure to wet the entire width of product on conveyors for maximum prevention.

## Solving Common Problems

It is easy to detect problems in wet dust control systems. Dust is still prevalent or the material is too wet and new problems occur such as quality issues and excessive maintenance. Unfortunately, the solutions to these problems aren't always straightforward and depend on the specifics of the operation. However, the guidelines that follow should prove useful.

### PROBLEMS:

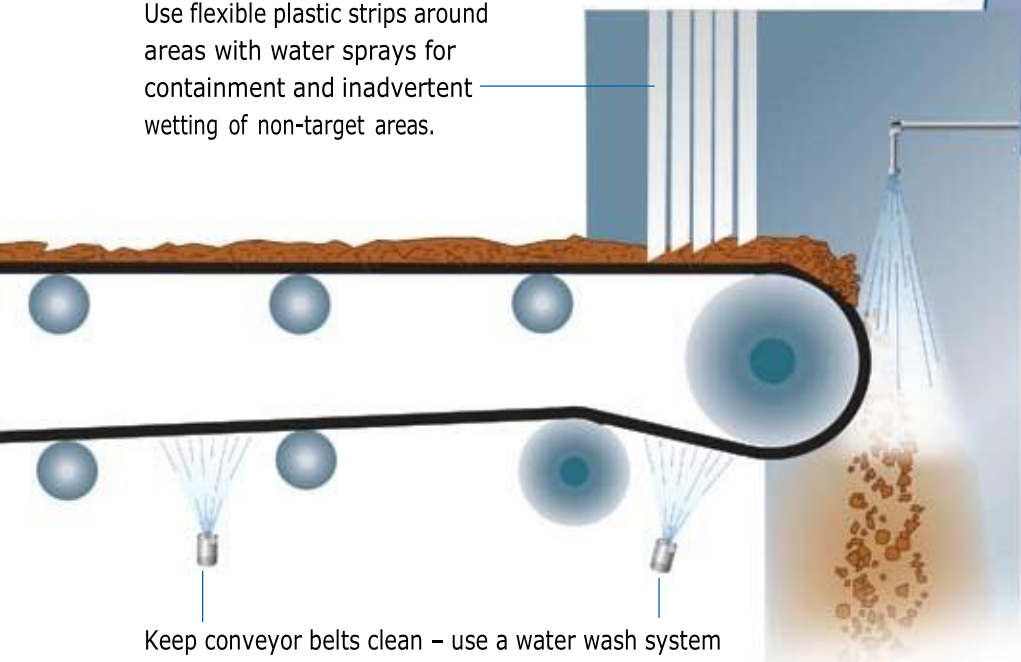
- Material is sticking to screen cloth/conveyors
- Sludge accumulation in chutes and areas around transfer points
- Belt slippage

### SOLUTIONS:

to reduce the amount of water being applied

- Reduce flow rate
- Use fewer nozzles
- Check nozzles for wear – capacity will increase as nozzle orifices wear
- Consider spray control to ensure nozzles are spraying only when required

Use flexible plastic strips around areas with water sprays for containment and inadvertent wetting of non-target areas.



Keep conveyor belts clean – use a water wash system to spray and scrape build-up from belts. Spray the bottom of return belts to reduce dust from a dry belt.

Use water instead of brooms to clean plant floors.

Don't overlook workers – install clothes cleaning systems to remove dust from uniforms.

**PROBLEM:** Too much dust

**SOLUTIONS:**

- Increase flow rate
- Increase the number of nozzles used
- Adjust nozzle placement to assure sprays are reaching the target area
- Consider enclosures to protect nozzles from air/wind or use nozzles with larger drops if sprays are drifting off target
- For airborne dust suppression, determine dust particle size and ensure nozzle drop size is comparable
- Inspect nozzles for clogging

**PROBLEM:** Handling material is difficult

**SOLUTIONS:**

- Inspect material. Uneven application of water will result in material inconsistency. Reposition nozzles for more uniform coverage
- Consider a change in nozzle type or spray angle to ensure consistent coverage

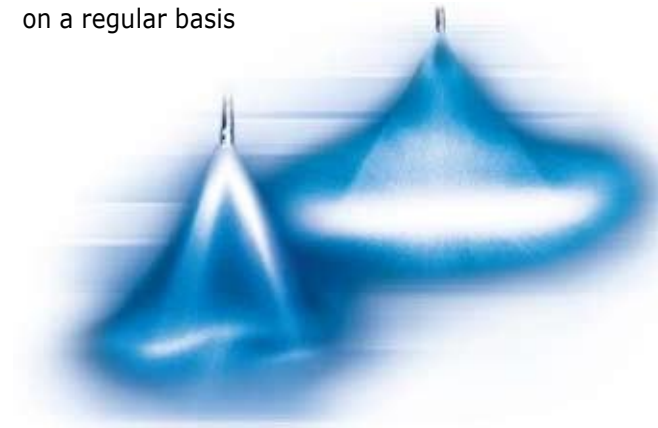
# Maintenance is Critical

## Preventive Maintenance

Spray nozzles are designed for long-lasting, trouble-free performance. However, like all precision components, spray nozzles do wear over time. Spray performance can suffer and costs can rise. How quickly wear occurs is dependent on a variety of application-specific factors. Other factors that can negatively impact spray nozzle performance are plugging, corrosion, scale build-up and caking. Establishing and implementing a nozzle maintenance program is the most effective way to prevent and minimize costly spray nozzle problems.

### Plugging/clogging:

- Use proper water clarification devices
- Use strainers
- Be sure to specify nozzles with adequate free passage
- Conduct maintenance on a regular basis



### Corrosion:

- Specify nozzles in the appropriate materials for the solutions being sprayed
- Scale build-up
- Control hardness level of the water
- Use chemical additives as needed
- Conduct maintenance on a regular basis



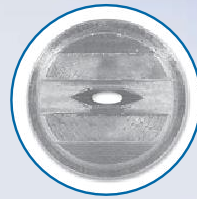
### Caking:

- Conduct maintenance on a regular basis to remove build-up inside the nozzle or on the exterior

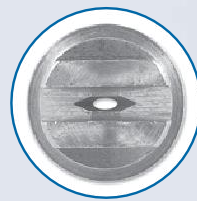


## Maintenance Tips

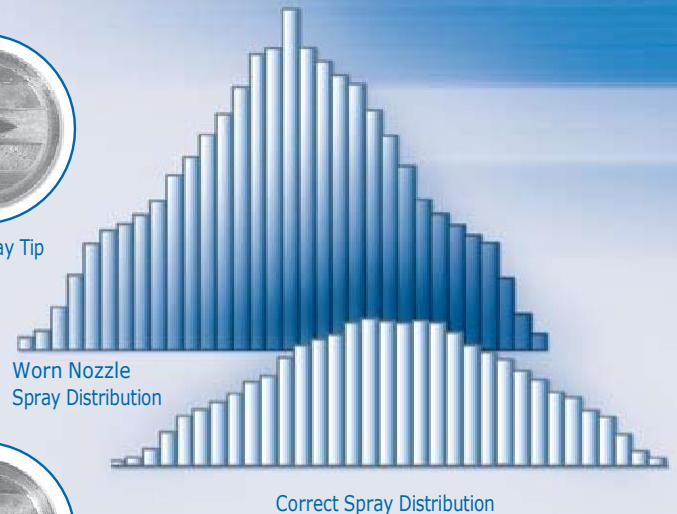
- Determine the optimal maintenance schedule based on the specifics of your operations
- Examine spray patterns and watch for changes in spray angles, distribution and heavy edges
- Wear may be hard to detect so go beyond visually inspecting nozzles. Check flow rate and spray pressure at a system level
- The nozzle orifice is precision engineered so be careful to avoid damage or replacement will be necessary
- Cleaning tools should be significantly softer than the construction material of the nozzles – toothbrush or toothpick. Never clean the orifice with metal objects
- Soak in mild solvent to loosen debris for easier removal with proper equipment



Worn Spray Tip



Good Spray Tip





## Widely Used Nozzles, Control Systems and Accessories

### J Series Air Atomizing and Automatic Spray Nozzles

- Very small drop size – ideal for use in airborne dust suppression
- Provides greater wetting per volume of liquid and reduces water usage
- Suitable for use with surfactants for greater wetting and decreased water consumption



### FogJet® Series Multiple Orifice Hydraulic Fine Spray Nozzles

- Small drop size – ideal for use in airborne dust suppression and some dust prevention operations
- Produces a fine mist or fog over a large area
- Suitable for use with poor quality water when a TW line strainer is placed upstream of the nozzle



### Fine Spray Hollow Cone Hydraulic Atomizing Spray Nozzles

- Very small drop size – ideal for use in airborne dust suppression
- Standard and wide angle spray patterns available
- Suitable for use with poor quality water – versions with integral strainers available
- UniJet® nozzles feature replaceable spray tips; bodies are re-used



T-W and TX  
UniJet Nozzles

LN Series  
Nozzles

### In-line BD and Right-Angle Series WhirlJet® Hollow Cone Hydraulic Nozzles

- Small to medium drop size
- Uniform distribution over a wide range of flow rates
- Lower profile projection for installation in a tee or pipe header



# Widely Used Nozzles, Control Systems and Accessories

## SpiralJet® Hydraulic Spray Nozzles

- Medium to large drop size
- Provides maximum liquid throughput for any given pipe size
- Full cone spray pattern or hollow cone spray pattern
- Extra large free passage versions available



## VeeJet® Flat Spray Hydraulic Nozzles

- Small to medium drop size
- Narrow to wide spray angles
- Unobstructed flow passages to minimize clogging



## FullJet® Series Full Cone Hydraulic Nozzles

- Medium to large drop size
- More impact than other nozzles
- Removable caps and vanes for easy inspection and cleaning on many models
- Maximum free passage (MFP) models for clog-free performance available



MFP FullJet Nozzles

G and H Series FullJet Nozzles

## Dust Control Systems

- Pre-packaged, pre-assembled, pre-tested system ready for use immediately upon delivery
- Can operate one or many nozzles, lances or headers
- Automated injection of chemical additives minimizes waste and ensures consistent application
- Choice of spray nozzles – wide range of flat spray, full cone or hydraulic fine spray atomizing nozzles

## T-Style Strainers

- Large open screen area for efficient liquid straining
- Designed for minimal maintenance
- Cleaning options: Removable bottom cap or plug for complete withdrawal of entire screen assembly, bottom pipe plug can be replaced with a drain cock for quick-flush cleaning, removable guide bowls and more



## 36275 Adjustable Ball Fittings

- Use to minimize overspray and ensure precise spray placement
- Simplifies nozzle positioning without disturbing pipe connections
- Smooth finished surfaces eliminate leaking



## Self-Cleaning Strainers

- AWS and AWT self-cleaning strainers provide fine filter protection to ensure optimal spray system performance even when using poor quality water. A unique filtering process captures most contaminants and extends time between flush intervals
- Large filter area captures most contaminants
- Wide filtration range - 20 to 600 mesh (800 to 10  $\mu\text{m}$ )
- Minimal water flow used for cleaning/flushing so downstream water supply is not interrupted



## Split-Eyelet Connectors

- Use to install nozzles, gauges and hoses in piping systems quickly and easily
- Eliminates body rotation within the flange when installing/removing nozzles
- Eliminates need for taping holes and provides superior thread engagement to eliminate stripped threads
- Reduces sediment and clogging - inlet extends into the pipe

