

## The use of Ultrasonic Nozzles in Dust Suppression

### Dust challenges faced by industry

Many types of industries face significant problems caused by dust.

Uncontrolled dust can cause serious health hazards and impact adversely on the environment. The presence of airborne dust can also exacerbate wear and tear on machinery and equipment, and reduce visibility which can create workplace safety problems.

Some types of dust such as coal dust, flour, grain and wood dust are also combustible and can explode, particularly in confined spaces.

It is for these reasons that most industries proactively seek to control the presence of airborne dust in their work environments.

### Types of industries most affected

Industries that are affected by dust include those involved in mining and resources, cement production, quarries, recycling plants and construction.

Organisations involved with the transport of goods such as coal may also require effective dust suppression strategies to be in place at transfer points.

### Methods of dust suppression

Over the years, a variety of methods have been employed to combat fugitive dust.

These have included dust collection systems, wet suppression systems and airborne suppression systems.

**Dust collection systems** use an exhaust hood to capture dust emissions where they occur, using a fan system to create suction. These systems also require ducts to transport the dust away from source, and a dust collector for the storage of the dust. Each step in the process must be working properly for dust to be effectively controlled. Dust collection systems require significant energy and ongoing maintenance.

**Wet suppression systems** wet the surface area of the dust, sometimes with water alone, or water mixed with surfactant. Problems can occur with over-wetting, leading to the formation of mud and sludge and creating unhealthy working conditions and environmentally damaging run-off. It is also more difficult to reclaim and reuse the materials that have formed the dust.

**Airborne dust suppression systems** use specialised nozzles to generate ultra fine liquid droplets that create a dry fog effect. Where liquid droplets are a similar size to dust particles, they are more likely to collide and agglomerate, and aided by gravity, cease to be airborne. Airborne dust suppression systems are less likely to generate the over-wetting problems caused by wet suppression systems because less liquids are required and the resulting droplets are so fine that they evaporate rapidly.

Ultrasonic nozzles are often used in airborne dust suppression systems. They atomise liquid creating a soft, ultra fine plume of droplets that can be propelled over an extended area.

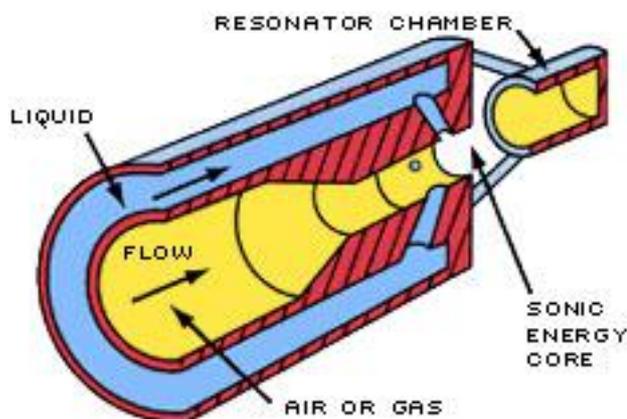
## How ultrasonic nozzles work

Ultrasonic nozzles offer a proven method of suppressing dust in a variety of environments.

They generate micro size liquid droplets via two phases:

- a) Liquid enters the spray nozzle outlet via a number of small orifices. The liquid then comes into contact with a high velocity airstream which shatters the liquid into smaller droplets.
- b) The air stream carrying the droplets impacts onto a resonator that is positioned in front of the spray outlet orifice. This generates an intense field of sonic energy that breaks down the liquid droplets further. Air containing the atomised droplets bypasses the resonator and is expelled from the nozzle, emitting a soft, low velocity dry fog.

Ultrasonic nozzles are available in a range of nozzle sizes and are adjustable to suit different flow rates.



*The internal workings of an ultrasonic nozzle are depicted at left.*

## Advantages of ultrasonic nozzles in dust suppression

The advantages of ultrasonic nozzles in controlling fugitive dust are many. These include:

### **Cost and environmental benefits**

Ultrasonic nozzles require less power and maintenance than dust collection systems and use less water than wetting systems. Because the dry fog generated by ultrasonic nozzles is efficient in combining with dust particles, ultrasonic nozzles work well using water only. This eliminates the need for chemical additives such as surfactants to aid the process, reducing operational costs as well as the impact on the environment.

### **Ease of use**

Ultrasonic nozzles feature an infinite turn down ratio and cannot dribble, even when the finest drop is atomised. They are also self-cleaning as the acoustic waves automatically keep the tip of the nozzle clean.

### **Reliability**

Because of their relatively large orifices, it is less likely that ultrasonic nozzles will clog. Their design ensures that they are able to generate a consistent droplet size over a wide flow range.

### **Safety**

Because the mist generated by ultrasonic nozzles is so fine, it evaporates rapidly, avoiding the formation of mud and sludge in the precinct. It also eliminates the need for dust collectors, thereby reducing the likelihood of an explosion caused by stored dust.

## Best demonstrated technology

In the US, fogging systems have been officially recognised as a 'best demonstrated technology' for coal handling equipment used on sub-bituminous and lignite coals by the US Environmental Protection Agency.

As a component of fogging systems, ultrasonic nozzles have proven particularly effective in the suppression of a range of moisture sensitive dust such as cement, clinker, copper concentrate and coal.

They help to create cleaner air using less water and power than other dust suppression methods.

## Find out more

Tecpro Australia has specialist expertise in the use of ultrasonic nozzles in dust suppression. We can assist you in identifying the most appropriate dust suppression solution to match the unique requirements of your environment.

Contact us on +61 (0)2 9634 3370 for further information.

### **About Tecpro Australia**

*Founded in 1982, Tecpro Australia specialises in providing reliable technical solutions for a vast range of industrial applications. Through their technical expertise and comprehensive knowledge, the Tecpro team prides itself on being able to solve even the most challenging engineering problems. Tecpro distributes spray nozzles, tank cleaning equipment, ergonomic guns, stainless steel hose reels water jet cutting supplies, fogging nozzles and fog makers for dust suppression and evaporative cooling.*

