

CNC MACHINING DUST, MIST, FUME AND SMOKE COLLECTORS

Computer Numerical Control (CNC) machining is a process where computer-aided design (CAD) and computer-aided manufacturing (CAM) programs are utilized to control the steps and functions of machine tool centers. CNC dust and mist collector equipment provides many manufacturing advantages including improvement of component quality and work center efficiency. CNC-based mist and dust collectors are applied in a broad range of industries and processes and are particularly common on the machining processes involving metals, plastics, composites or other base materials.

Some of the key benefits gained from using from CNC dust and mist collectors include:

- Protecting worker health
- Reduced exhaust air make-up requirements up to 80% through recirculated conditioned air
- Extended machine life
- Reduced operational costs through reclamation of lubricants
- Improved part / product quality
- Reduced housekeeping costs
- Compliance with even the strictest federal, state and local environmental standards

Contaminant Characteristics

Contaminants from CNC machining processes fall into three broad categories:

- **Metalworking Mist and Smoke** – When coolants and lubricants are applied to machining processes, the generated force and heat creates mist and smoke. The type of contaminant depends on what coolants are being used and the machining parameters. Water-soluble coolants produce a mist with larger droplet sizes where straight oils produce more of a smoke that can be submicron in size. Higher speed machines or processes that generate a large amount of heat will produce higher concentrations of contaminants.
- **Dry Machining Dusts** – Dry machining will produce contaminants from the material being machined and the process heat. The contaminant will generally be a mix of larger particles from the displaced material and finer dust particles from the machining process. The properties of the material being cut, type of machining process, cutting rate, and the hours of operation affect the contaminant generation rates and contaminant size.
- **Plastic Fumes** – When plastic materials are processed, there is often a plasticizer contaminant that is emitted. This can happen during extrusion due to coatings or residuals left on a die or mold. They are generally submicronic smoke contaminants that are tacky or sticky. These emissions are harmful to workers who can breathe in the hazardous particles during operation of the machine if the smoke is not properly captured and controlled.

Recommended Approaches for CNC Machining Mist, Dust & Fume Control

Controlling CNC contaminants begins with a thorough review of the process. For machining centers, keeping the volume under a negative pressure with sufficient capture velocities on all open areas can be an effective method to control the contaminants. The actual airflow required is based on the type of contaminant and the geometry of the machining center.

When CNC machining is done without an enclosure, the following two methods are possible solutions for controlling the generated contaminant:

- **Source Capture.** Capturing the mist, dust and fume at the source is an effective approach for controlling CNC machining emissions. Source capture involves utilizing local or canopy hoods to capture the contaminant as it is generated. Capturing the contaminant at the source protects workers and prevents the contaminant from migrating throughout the factory. Source capture is the most effective means of capture and requires the least amount of energy and initial investment to accomplish.
- **Ambient Air Collection.** When source capture is not possible, filtering ambient air can be utilized to control the fume concentrations in the facility to a more acceptable level. Ambient systems will help remove the ambient haze caused by the airborne pollutants but these systems will not protect the worker's breathing zone.

Product Solutions for Collecting CNC Machining Mist, Dust, & Fumes

We offer a full line of fume extraction and collection equipment that can be utilized to safely control CNC machining mist, smoke and dusts. The list below indicates our products that are most commonly applied into CNC machining applications. Our

application engineers can help you select the right product with the appropriate options and accessories such as multi-pass electrostatic precipitator (ESP) filtration, mist-stop filters, abrasive inlets, drain loops, HEPA after-filters, and more to meet your specific application and facility needs.

Our products that are most suitable for CNC machining applications include:

- for collection of mists and fumes:
 - [Smog-Hog® MSH Compact Mist Collectors](#)
 - [Smog-Hog SHN / SG Series Mist Collectors](#)
 - [Smog-Hog PSH / PSG Series Central System Mist Collectors](#)
- for collection of dusts and fine particulate:
 - [C Series Cyclone Dust Collectors](#)
 - [SFC Series Downward Flow Cartridge Dust Collectors](#)

NOTE: When capturing abrasive dusts, using a system with an abrasive inlet will minimize equipment deterioration and maximize cartridge filter life.