

Screw Machines

- Industry:** Metal Working & Machining
- Contaminant:** Oil mist, smoke, fine metal particulates
- Equipment:** Inertia Impinger (heavy loading or large oil mist droplets are present), electronic air cleaner, activated carbon for odor control (optional)
- Efficiency:** 95% DOP per MIL Standard 282
This efficiency is maintained at a constant rate with proper unit maintenance. This is not an "average" efficiency as experienced with other media units.
- Process Description:** Screw machines produce finished metal products from round stock. The stock is fed to the machine automatically from a magazine-fed stock reel and held in position by collets. Screw machines cycle automatically finishing a part each time the machine indexes.
- Contaminant Characteristics:** Like most metal working operations, tremendous heat is generated during the cutting process. The lubricants can be either a petroleum-based oil or one of the many water-based coolants. Whichever is used during the manufacturing process, some of the coolant will be vaporized due to the high temperatures generated by the tool, thus producing smoke. Additionally, due to the high speed of the tool, some coolant will be thrown into the air, generating mist.
- The amount of smoke and mist generated by screw machines depends on the size of stock, type of machining, the speed of operation and the depth of the cut. In general, the larger the diameter stock and the wider or deeper the cuts performed, the heavier the smoke and coolant mist that will be generated.
- The dark, nutrient-rich constant temperature oil sump provides an excellent breeding ground for microbial growth. These microbes can then be spread throughout the plant in the oil mist.
- Design:** Containing the coolant within the tool cabinet is of primary importance. On most screw machines, some type of splash guard is present to contain the varying degrees of the expensive cooling lubricants within the cabinet. These lubricants then drain back into a large reservoir in the base of the machine. With source capture being the ideal capture method, ducting is connected directly to the splash guards. Flex duct may be used sparingly to allow the splash guards to slide back for tool access.
- For machines which do not have splash guards, retrofitting with moveable guards should be considered, then ducted accordingly.
- Equipment Sizing:** An individual air cleaning unit for each screw machine, or several screw machines may be ducted to a single ESP.
- The air volume required for proper ventilation will vary, depending on the size of the open area within the cabinet and access door area. The open area (in square feet)

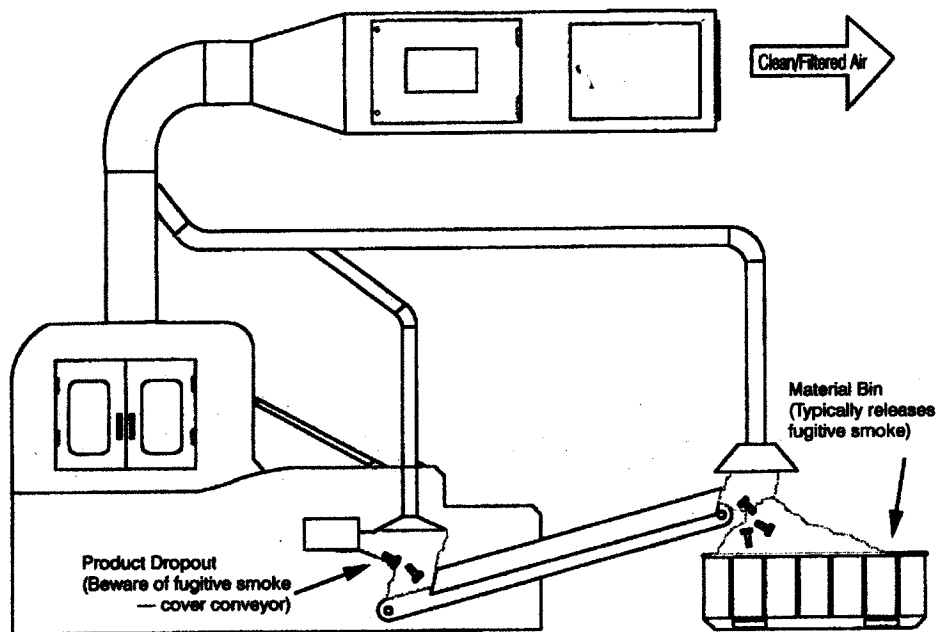
should be calculated and multiplied by 100 to 200 feet per minute capture velocity to determine the air volume required. If canopy hoods with curtains are used, the capture velocity should be between 200 and 500 feet per minute face velocity. Standard hood design and ventilation rules apply. Ductwork sizing should be based on 1500-2000 FPM transport velocity. See Industrial Ventilation Guide for static pressure of inlet and ducting design assistance.

Maintenance Consideration:

Drain plug assemblies for P-trap or drain bottles are required to recover liquid contaminant runoff from collection cell(s).

Maintenance requirements depend upon the type of coolant and hours of operation. However, the internal components could require cleaning every 3-6 weeks or as much as 6 months between cleanings. An automatic oil wash system may be installed on larger systems to reduce labor cost and cut down time requirements.

Typical System Arrangement:



References:

Industrial Ventilation Manual (American Conference of Industrial Hygienists)

System Benefits:

- 1) High efficiency air cleaning
- 2) Coolant recovery and recycling reduces waste removal cost
- 3) Continual operation, shut down for required drain time not necessary as on most media systems
- 4) Constant high efficiency air cleaning — not an "average efficiency"
- 5) Automatic wash cycle
- 6) Recovered coolant is generally returned to the screw machine's coolant reservoir.