MIST COLLECTOR BAFFLES - BACKGROUND, DESIGN, AND INSTALLATION:

Rain vs Fog

Think of coolant spray like being outside in wet weather — it can come in two forms: **rain** or **fog**.

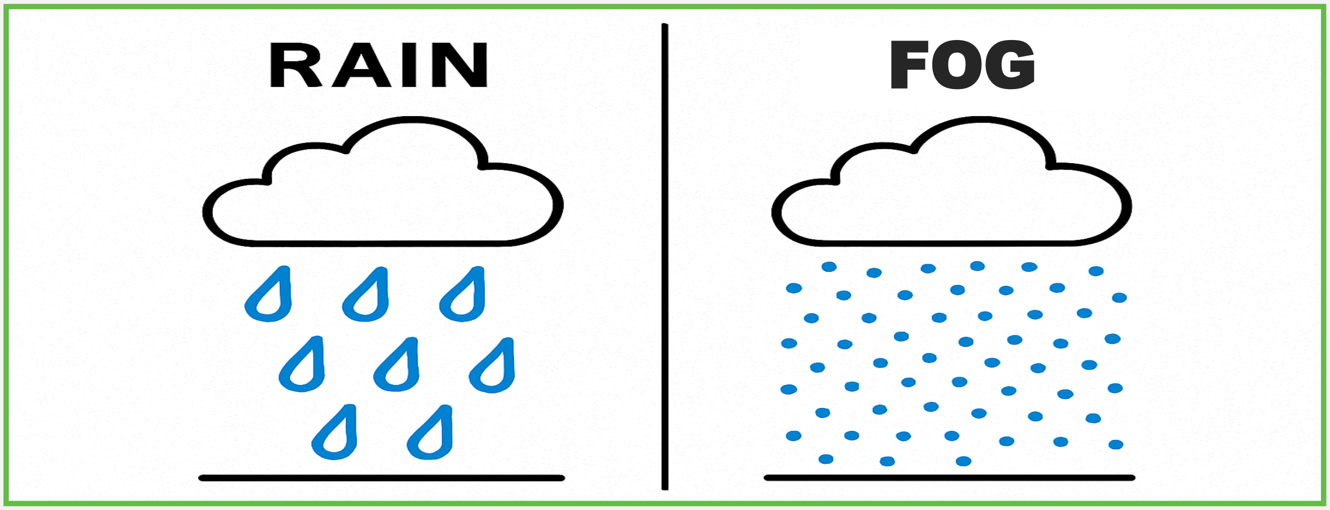
- **Rain** is heavy and falls straight down. If you're outside in the rain, your clothes get soaked quickly and you'll want to change them as soon as possible.
- **Fog**, on the other hand, is light and hangs in the air. Fog will make your clothes damp as you walk through it, but it will evaporate relatively quickly.

In the same way, **coolant spray inside a machine tool** can either be **rain** (large droplets that fall straight down) or **fog** (tiny droplets that stay suspended in the air). Our mist collection system is designed to **capture the fog**, not the rain.

In short:

- Fog is what we want to collect — it stays suspended in the air.
- Rain should be left alone to fall harmlessly — like rain hitting the ground.
- The baffle helps make sure we only capture the fog, not the rain.

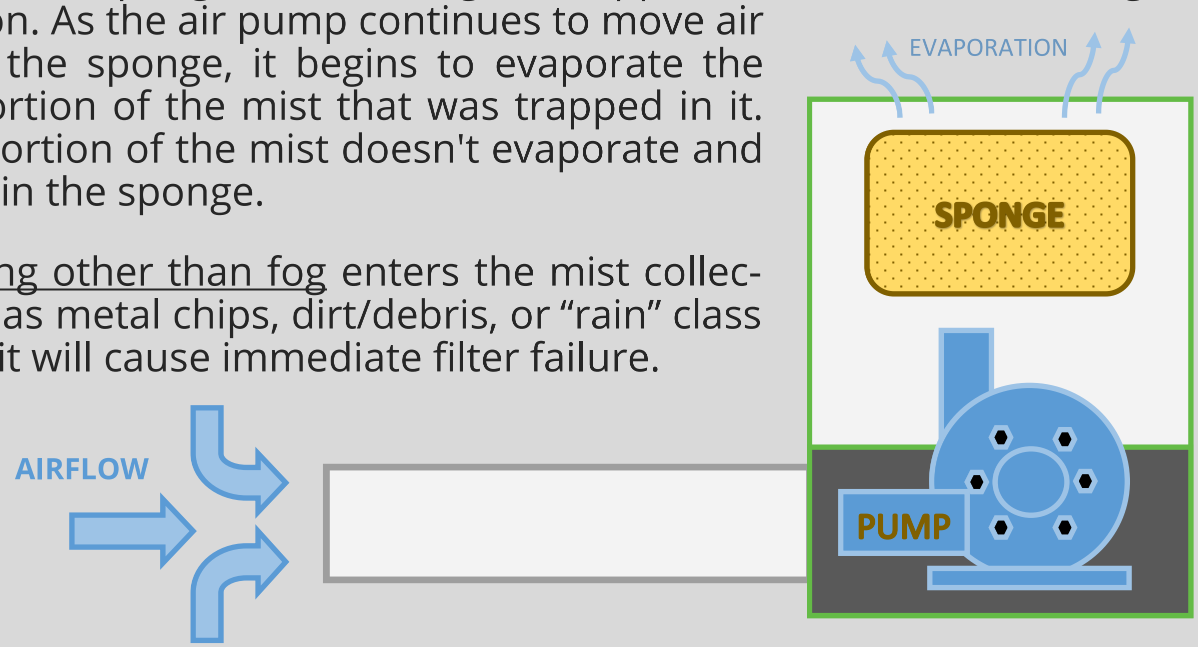
A **properly sized baffle is important**. It slows down the airflow at the mist collector's inlet. If we don't slow the air down, it will suck in the rain along with the fog which will clog the filters, leading to shortened filter life and increased maintenance costs.



Basics of a Mist Collector

A mist collector can be thought of as an air pump and a sponge. The air pump pulls in air from the machine enclosure that is contaminated with fine mist and pushes it through the "sponge". When the mist goes through the sponge, the mist gets trapped in the fibers leading to saturation. As the air pump continues to move air through the sponge, it begins to evaporate the water portion of the mist that was trapped in it. The oil portion of the mist doesn't evaporate and remains in the sponge.

If anything other than fog enters the mist collector such as metal chips, dirt/debris, or "rain" class coolant, it will cause immediate filter failure.



Objective of a Mist Collector

Mist collectors are designed to prevent mist created in the machining process from exiting the machine tool. Mist can escape the machine in two ways.

1: Machining cabinet doors are opened.

2: Holes in the machine.

We prevent mist from escaping by creating negative pressure in the machining cabinet by pulling air into the cabinet. How much negative pressure we need is determined by the machining cycle.

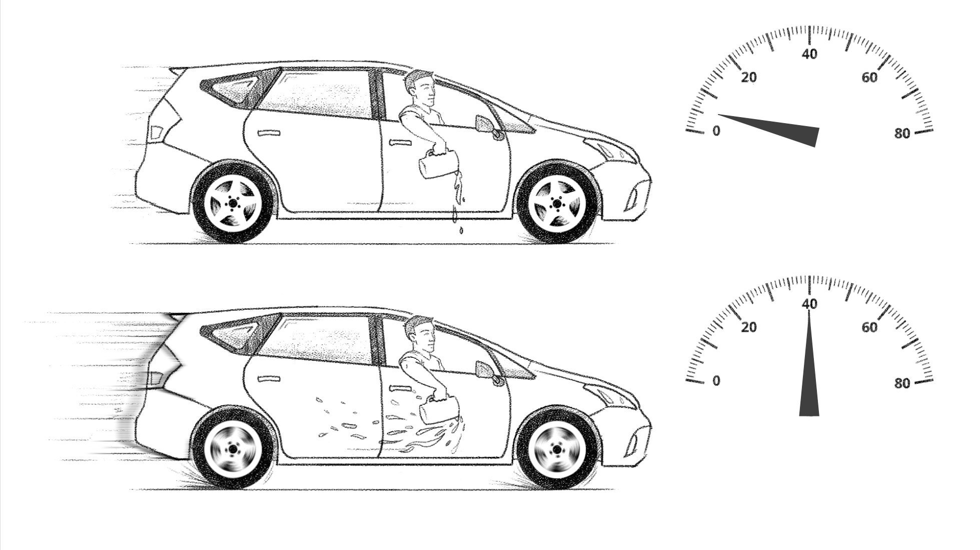
High Volume, Short Cycle - Doors open frequently. This process requires adequate negative pressure such that the mist in the cabinet never has the opportunity to build up.

Low Volume, Long Cycle - Doors remain closed for long periods. This process requires enough negative pressure to constantly draw air in so that mist doesn't leak out of the cabinet. The mist collector must be able to move large volumes of air rapidly just before the doors are opened to fully remove the mist.

EFFECT OF AIR VELOCITY ON FLUID TRAVEL

Take a look at the example below. Imagine driving across a parking lot at 5-10 MPH. Now imagine you poured your coffee out the window, what would happen? The coffee would appear to fall straight to the ground. Now do the same thing at 40-50 MPH. The coffee would rapidly accelerate toward the rear of the car.

This is the situation we want to avoid in the machine tool cabinet. We want our air to be traveling as slow as possible so that the large “Rain” particles fall straight to the ground, instead of getting sucked into the mist collector.



GOOD: Fluid Drops Straight Down at Low Wind Velocities

BAD: Fluid Is Pulled Toward the Rear of the Car by High Wind Velocity

WHY INSTALL THE BAFFLE

- Decrease Air Inlet Velocity (Speed)
- Maintain Inlet CFM (Volume)
- Block Direct Spray From Entering the Mist Collector
- Negate Short Filter Life
- Less Filter Changes = Decrease Downtime = Decrease Cost

BAFFLE INSTALLATION LOCATION REQUIREMENTS

1. The baffle cannot be installed in a location subject to a pinwheel of coolant caused by a rotating spindle or from coolant impact on a surface.

2. The baffle cannot be installed where spray from a nozzle or its resulting splash could enter the baffle. A nozzle is never allowed to be pointed toward the baffle.

3. The baffle must be installed such that it can deflect any additional spray that may come towards it.

4. Wall mounted baffles must be sealed on their uppermost edge.

5. Ceiling mounted baffles must be sealed on the edge closest to the spindle

Failure to comply with these installation requirements can result in immediate filter failure.

BAFFLE DESIGN

A baffle MUST decrease the inlet air speed to the mist collector below 10 mph. The bigger the baffle, the better it works.

Refer to Figure 1 for the dimensions required to calculate the air speed in MPH for a baffle used on a mist collector with a given CFM. Refer to Figure 2 for a chart displaying the MPH at a given CFM for a particular baffle size.

If your calculated flow rate in MPH is < 10MPH, the baffle will decrease the inlet air speed enough to demonstrate positive effects.

Standard Baffle

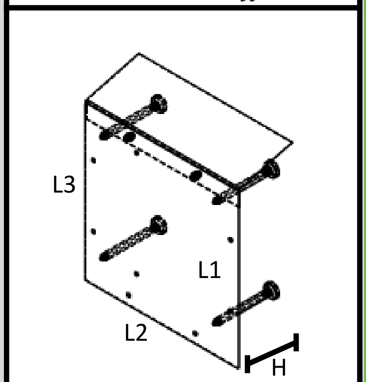


FIGURE 1

Air Speed With 15" X 15" Baffle	
CFM	MPH
700	5.1
1000	7.3
1200	8.7
2300	16.7

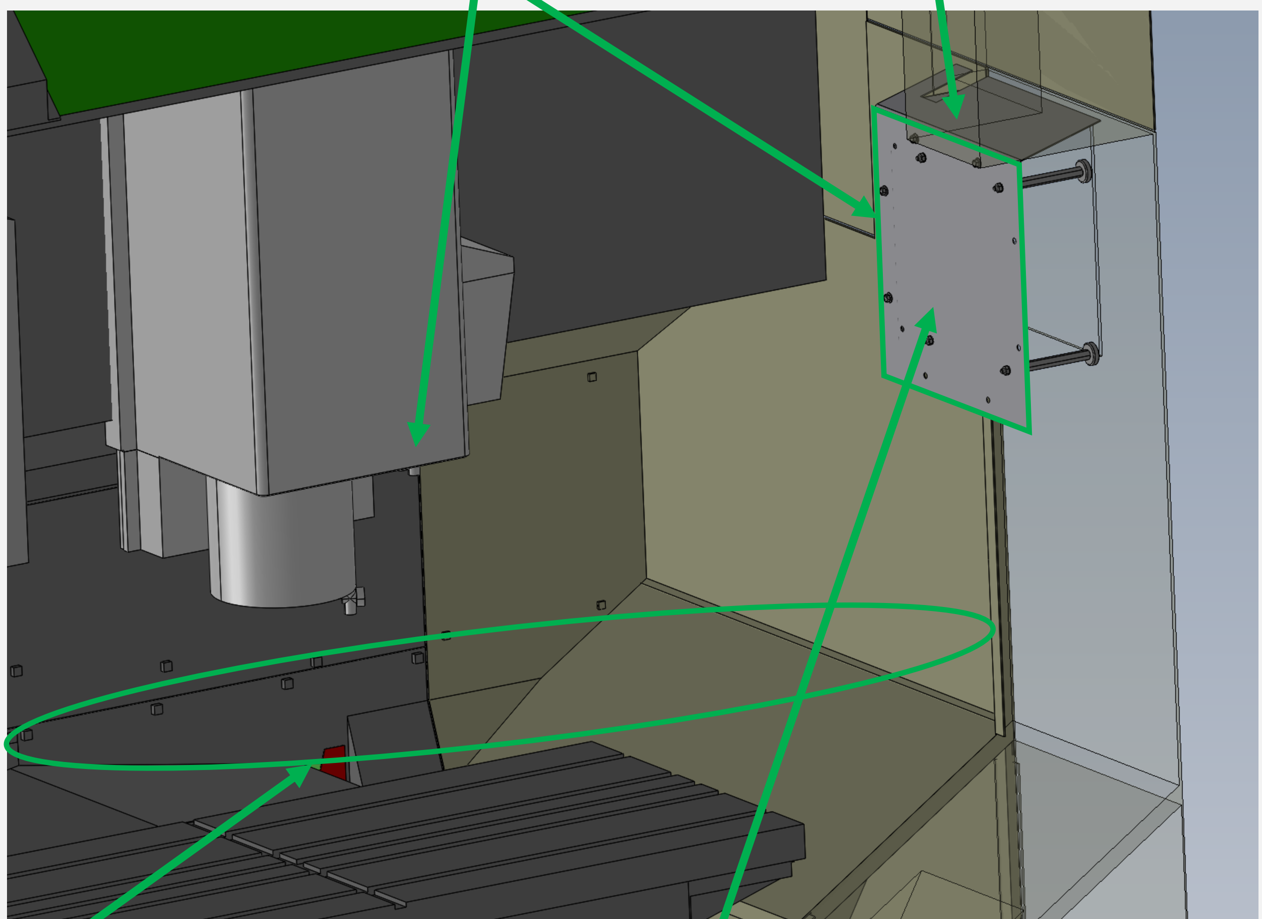
Air Speed With 25" X 25" Baffle	
CFM	MPH
700	3.1
1000	4.4
1200	5.2
2300	10.0

FIGURE 2

EXAMPLE OF A CORRECT BAFFLE INSTALLATION

The baffle cannot be installed where spray from a nozzle or its resulting splash could enter the baffle.

Wall mounted baffles must be sealed on their uppermost edge.



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