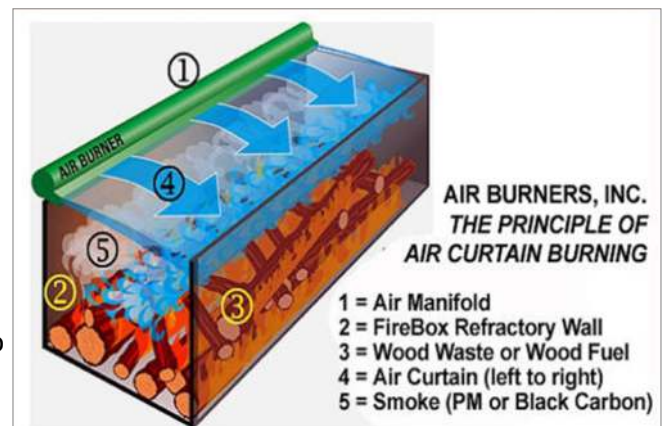


THE PRINCIPLE OF AIR CURTAIN BURNING

Overview

Air Curtain Burners, also called FireBoxes, were designed principally as a pollution control device. The primary objective of an air curtain machine is to reduce the particulate matter (PM), smoke or “black carbon”, which results from burning clean wood waste. It is sometimes hard to visualize without seeing a machine in operation, but the machines do not burn anything, rather they control the results of something burning.

You could look at it as a pollution control device for open burning. Clean wood waste is loaded into the FireBox, and an accelerant such as Diesel fuel is poured onto the wood and the pile is ignited. This is very similar to starting a campfire. The air curtain is not engaged until the fire has grown in strength or the air curtain may blow the fire out. Once the fire has reached suitable strength, usually in 15 to 20 minutes, the air curtain is engaged. The air curtain then runs at steady state throughout the burning operation and the waste wood is loaded at a rate consistent with the rate of burn. Our smallest machine will burn at a rate of 2 to 4 ton per hour, our largest machine can burn in excess of 12 tons per hour.



The Principle

The purpose of the air curtain is to stall or slow down the smoke particles on their way out of the FireBox. In doing this the particles are subjected to the highest temperatures in the FireBox. Stalling the smoke particles in this region just under the air curtain causes them to re-burn, further reducing their size to an acceptable limit. The result is a very clean burn with opacities well under 10% per EPA Method 9 Testing (as compared to open burning which typically can run at 80% to 100% opacity).

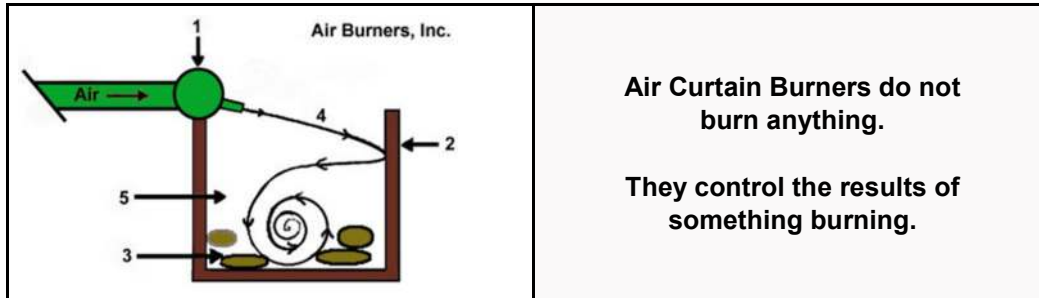
Operation

The picture to the right shows an Air Burners FireBox S-327 completely full and burning while in the background a pile of wood is open burned.



The wood pile that is open burning continued to burn for two weeks. That entire pile could have been eliminated with the FireBox in less than 20 hours.

For proper operation, the air curtain machine has to be designed to provide a curtain of air over the fire that has a mass flow and velocity that are in balance with the potential mass flow and velocity of the burning wood waste. If the air curtain velocity is too high, the FireBox or Trench can become over pressurized and over agitated. The higher pressure will lift the curtain and cause it to become ineffective. The over-agitation will cause embers and ash to be blown out of the box or pit past the ineffective air curtain at a significantly higher rate than normal. If the mass flow of the curtain is too low then the unburned particles (smoke) will penetrate the curtain on the high velocity of the hot gasses being generated from the burning wood.



"The Wood Waste is the Fuel"

1. Air curtain machine manifold and nozzles directing high velocity air flow over and into refractory lined fire box or earthen trench.
2. Refractory lined wall as on the S-Series machines, or earthen wall as used with the T-Series trench burners.
3. Wood waste material to be burned .
4. Initial airflow forms a high velocity "air curtain" over fire.
5. Continued air flow over-oxygenates the fire keeping temperatures high. Higher temperatures provide near 100% combustion efficiency and that results in a cleaner and more complete burn.

[See 70 sec. Streaming Video Clip of an operating FireBox here](#)



RECYCLING

The ash from typical wood waste is a very useful soil additive and as such offers a commodity that can be marketed to plant nurseries, farms, etc. as a potting soil additive. A certain amount of Biochar will also be included in the residual ashes. Recycling our resources is not only socially and politically imperative, but it often reaps the additional benefit of tax incentives or tax credits. Solid waste landfills are diminishing rapidly, and permits are difficult to secure for new sites. The Air Burners System provides an affordable and environmentally sound alternative to grinding and the indiscriminate depositing of woody debris into landfills.



Related Reports

Disposal of Woody Debris by Fire with perfect combustion efficiency releases no Black Carbon and virtually only Bio-genic CO₂, making this process carbon neutral.

[CLICK HERE](#)

Air Curtain Burner vs. Wood Grinder - Disposal of Wood Waste

A Comparison of Critical Emissions and Basic Economic Parameters from Two Disposal Methods.

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Disposal of Trees Affected by the Pine Beetle - The Dilemma and why Air Curtain Burners Should Be Used.

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