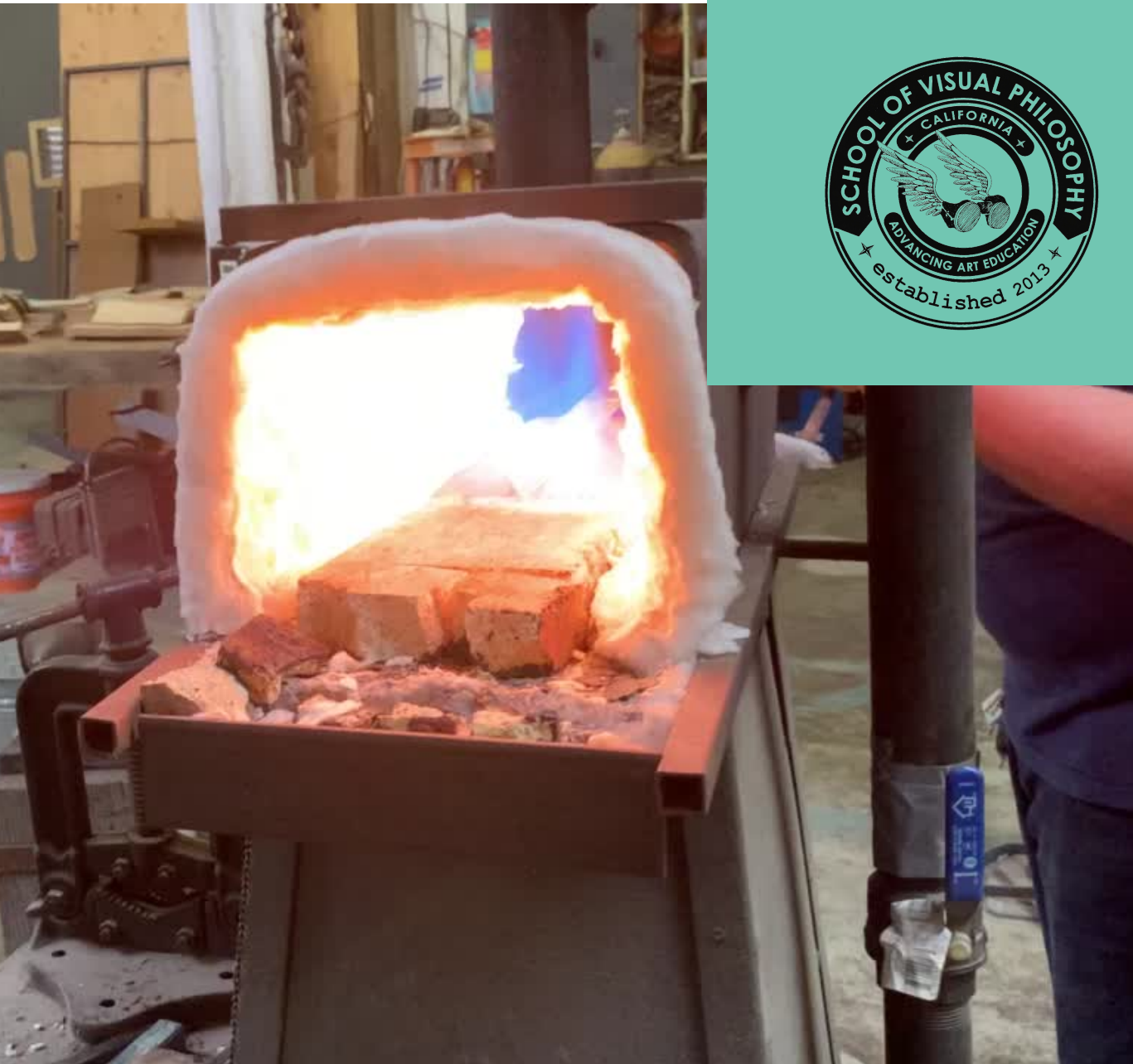


SCHOOL OF VISUAL PHILOSOPHY

# BURNERS



INSTRUCTED  
BY YORI SEEGER

# BURNERS

## Venturi vs. Forced Air

I have been building forges and furnaces for twenty years. With a lot of trial and error I have settled upon the following design for forced air burners, which I use in forges and melting furnaces. These burners are easily adjustable and work great for melting aluminum, bronze, and even iron. Of course they are also great for blacksmithing and bladesmithing forges as well.

The reason I switched to forced air burners is the ease of fine tune adjustments as well as speed and ability of getting up to forging temperatures. Twenty years ago, I started by creating Venturi style burners which act like a carburetor where the combustion at the end of the burner draws air into the system. The amount of air is controlled by a choke and the flame is governed appropriately. Venturi burners are very common and yield great results. The biggest advantage of a Venturi style burner is that it does not need electricity to function.

The forced air burners that I illustrate in this course rely on a blower to introduce air into the system, and therefore must be in the vicinity of electricity. I control the airflow with the forced air system by a ball valve. All of this is important because the ratio of fuel to air is how you can control the flame and therefore the heat. .

# BURNER DESIGN

---

Forced air burners are significantly simplified compared to their Venturi counterpart. I do confess that it took me several years to simplify the burner to its current design and I won't bore you with the many previous versions. This burner is essentially two pipes with the smaller one being fed into the center of the larger one. That's basically it. The diameter of the pipes will vary depending on the chamber of your forge or furnace. I am going to refer to the forge in this class and the pipes will fit that design.

I use an 1.5" -2" pipe for the airflow. I have found that round pipe seems to be better but you can achieve similar results with square tubing. For a good ratio of air to propane I use a 1/4" tube for the propane inlet. The key is to adjust the end of the propane inlet so that it rests inside the pipe for the air inlet. The exact depth will vary a little and I make the adjustment in real time. When I install the burner I permanently anchor the air inlet so that it protrudes to a level plane with the kaowool. I then insert the propane inlet and light the burner. While the burner is going, I move the propane inlet in and out until I achieve a nice blue flame that does not sputter, fork, or separate from the mouth of the burner. I then mark that spot and permanently anchor the inlet of the propane to the air inlet solidifying the burner setup. It really is that simple.



# BURNER DESIGN

## Fuel and Air

The next key to a good burner is the fuel and air sources. I use propane and you can read more about this in the lecture on propane so we won't go into it here. For a forced air burner you need a blower. I have used everything from hair dryers to \$300 squirrel cage blowers. In the end I settled on the blowers used for dust collection systems. The one I like is rated at 650 CFM or Cubic Feet per Minute. I find this provides plenty of airflow for normal forging and easily adjusts up to forge welding temperatures. I use the same blower for smelting furnaces as well. I like these blowers because they last. They are designed for long continuous use and some of mine are still going strong after six years of service.

The last important bit about the burners is the control system. You will need to be able to adjust the ratio of propane to forced air. This begins with setting the regulator from the propane tank. Mine has been set at 25 PSI and I have not touched it in years. The other two adjustments are in-line ball valves- one to adjust and shut off the propane and the other to adjust the quantity of forced air. When you adjust the ratio keep in mind that too much air or too little propane look the same. In this situation you will have large yellow flames lapping out the mouth of the forge. (I demonstrate this in the forge video). A good adjustment should yield a blue constant flame from the burner and you should have very little to no yellow flame escaping the mouth of the forge. You want a good flame but be wary of having an oxygen-rich or oxygen-lean setup. In the forge video I show examples of what it looks like to have a good flame. I also demonstrate what it looks like with too much and too little oxygen as well as too much and too little propane.