Pit Temperature Control

(What to do with my Dampers)

So you have a smoker and you are confused about how to control your temperature. Here are a couple of things that might help you get started:

First, temperature is controlled by adjusting the damper (or vent) that is closest to the firebox or heat source. The other vent, usually a tall stack coming out of the top of the smoker, is the exhaust. Always keep that one open. It allows the smoke to escape and that keeps you from getting bitter flavors. It also creates the "draw". Draw is a vacuum that pulls air into the firebox. Let me say that again: "pulls air into the firebox". You aren't pushing air into the firebox, you are pulling it in. In later articles I'll talk about how important that thought is to keep in mind when you overload your smoker with food. But for now just remember that the exhaust is always wide open during the cook.

Next, we will talk about the intake damper adjustment. Temperature in you cooker is directly affected by volume of ignited fuel and the amount of oxygen feeding it. When the damper is wide open, a large amount of air will be sucked in and will fuel your fire to the maximum of your smoker's capability. Closing the damper all of the way will choke your fire of oxygen and eventually cause it to go out.

RECAP: Intake damper open = heat goes up. Intake damper closed = heat goes down. Exhaust is always wide open.

That was basic control. Earlier I mentioned that temperature was related to oxygen, but I also said that the amount of fuel will also effect it as well. This is important because as your cooker runs on a long cook, your fuel supply will run out. No amount of oxygen will stoke a fire that just isn't there. So, occasionally you will need to feed the firebox more fuel. There are different reasons why you would or would not feed it with lit or unlit coals, but that's a different article. For now, if you are using lump, feed it with unlit coals. If you are using bricks (and you really shouldn't be) light them first in a chimney starter to cook out all of the binders before adding to the cooker.

Next is understanding how the damper changes temperature. It's different for each smoker design, but just think of your smoker as a really heavy truck with a small engine. If you mash the gas pedal, it's going to take some time before you get up to speed. Once you do get up to speed, letting off the gas won't do a whole lot because the weight will still want to go forward. Most smokers are the same way. If you open the damper 100%, your temperature will increase slowly at first, then pick up speed and keep going. If you wait until you hit your desired temperature to shut it down, the temperature will keep going. This is called overshoot. To keep this from happening, you need start reducing you damper amount well before your desired temperature is reached. Going back to the truck analogy, if you see a stop sign ahead, you don't wait until you get there and slam on the breaks. No, you let off the gas and slowly apply the break. How much break? It depends: How big is your truck? Are you going down hill? How fast are you going? It's the same way with your cooker. There are several variables that you need to keep in mind when backing off the damper. Most of them you will learn as you go, but here are a couple:

1.) How quickly is your temperature rising? Obviously is it is rising fast, you need to hit it early.

2.) How windy is it? On windy days, air will get pushed into the fire box, over-stoking your fire. On windy days, it is usually best to let your cooker come up to temp slowly. Start at about 25%-30% open. Let it run for about 20 minutes and add damper in 10% adjustments as needed.

3.) How much did you adjust last time...and when? If you constantly have to make adjustments, most likely you are over adjusting. In the temperature control world, this is called oscillating (or vibration). In the cooking world, it doesn't really hurt anything, but it can get really frustrating. It can also reduce your fuel efficiency; causing you to run out of charcoal faster than you planned. Keep a log of your adjustments at first. If you find yourself adjusting up and then down every 20 minutes, adjust it by half the amount next time.

I realize this is a lot of information for something that is supposed to be so simple, but it will eventually become second nature. This is actually what got me involved in designing my control system in the first place. Once I learned how to build a machine to control the machine, I knew enough to control the machine myself. You will too.

RECAP: Make changes early (before your hit your desired temp). Make small changes. Be aware of the conditions (wind, outside temperature, etc.)