Kiln Care 101

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The following is designed to help anyone with an electric kiln safely diagnose their kiln issues. After repairing kilns for the past 10 years I can break down the required care for your electric kiln into two parts, the **electrical components** and the **physical body** of the kiln. The following are the procedures I use when inspecting a kiln.

Step 1: Listen to what the owner or kiln operator has to say *(intended for repairmen)*

Often you will pick up valuable information. At times this step can cause more confusion then help, but with a well informed user, they will have the most experience with that particular kiln and their comments and thoughts should be considered.

Step 2: Check power to wall outlet

I can't tell you how many times I find a 240V kiln in a school with 208V of power running to the kiln. All homes in the United States are wired 240V and most schools or industrial buildings are 208V. Before buying a kiln, make sure you know your power supply. I also check the distance from the power source to the kiln. If this is a long way, (beyond 50 ft), it is possible the kiln will have a drop in power. All certified electricians are required to upgrade the wire if the run is a certain distance from the equipment. So instead of running #6 copper wire they may run #4 copper which is a thicker line. If you meter your actual idle power and confirm you are getting 7% less than what is required, for example 193V for a 208V line, it is very possible that there will not be enough actual power, "wattage", created to fire your kiln at its peak. Volts x Amps = Watts. There are times especially in the summer months when electric suppliers cannot keep up with demand and you will see a service drop. So if your kiln is not getting to temperature in the middle of August, this could be your issue.

Note about Power Supply: Always know where your main power source is. In a home power comes from the street transformer and into your main breaker box. Older home have 100 Amp services and most new homes are 200Amps. Your main power source is the gray box with the black switches, or fuses). In a school or business it is very likely the box that houses your breaker switches is a sub panel. There is a difference between the two. In your main source panel the ground and the neutral are essentially the same thing, in a sub panel they are not. Always make sure you hire an electrician if you do not feel comfortable around your power supply.

Step 3: Check the power cord

Is it touching the kiln? Check the plug head itself, many kilns have never been unplugged since the day it has arrived. You might be surprised to find a nearly melted out socket or a plug prong. If the power cord head is shot always replace the receptacle as well.

Step 4: Check the outlet

Is the outlet installed correctly (Upside down?) If it is, this can create a loose connection between the plug and the female receptacle. Heat then will build and this is where I see burned out receptacles and even fires at the outlets. The best hook up for any 50 + amp kiln is hard wired into a shut off. Make sure the shut off is installed somewhere you can actually get quickly and safely.

Step 5: Check idle power to the kiln

Open up the box and place a meter on the incoming power with the kiln on. Check to see that the kiln is drawing the proper load. I approach each kiln with the potential that someone else may have worked on the kiln. You have no idea if they have done everything correctly. I do not assume anything, and approach even the easiest kiln inspections with the same awareness as a complex older kiln would require.

Step 6: Check elements

After placing small pieces of toilette paper on the elements, I turn the kiln on with the lid open. This tells me a few things, how fast the tissues burn can indicate element life it also instantly tells me if any elements switches or relays are broken. Elements start off shiny silver, as they get older they go from dark gray to light gray, and then to a white ash color. Think of a cigarette. When elements lay down, like dominoes in a row, this is a sure sign they are on their final leg. You can also check the ohms of each element with a multi-meter. This is not as complex as it sounds. Turn your meter dial to the Omega symbol and hold one end of the meter to one end of the element and the other end of the meter to the other opposite end of the element. You may here a beep, which indicates continuity, (that the element is not broken). Kiln companies can tell you what the ohms meter reading is on a new element and you can compare that to your current condition. A good rule of thumb is if the current element is10% past the original reading, you should replace the element. If you are checking an element that is linked to other elements, this will give you a different reading. Make sure you are clear when you give the reading, where on the kiln you took it.

Note about elements: The materials or metals that easily allow electron movement are said to have low resistance (or are good conductors of electrons).The opposite of a good conductor is a material that allows no electron flow between the atoms. These materials are called insulators. The plastic wrapping on a piece of wire keeps the electron move contained to the metal inside the wire. Somewhere in-between a good conductor and an insulator are kanthal kiln elements. They are specially designed to allow some electron movement. The benefit to this type of material is it will produce heat as the voltage moves the electrons through the material. Before the electrons move they encounter resistance. Not all elements are the same, the thicker the gauge of the element will typically relate to a longer lasting life.

Step 7: Visually inspect the control box

Just because a switch or relay works doesn't mean it shouldn't be replaced. Often the switch tabs or relay tabs are loose indicating they will go soon. Rust is common as well as oxidation on connectors both of which prevent a good flow of electrons. Does your kiln make a buzzing sound when it fires? This is vibration in those connections and the elements themselves. When I visually inspect a kiln I pretend as if I built each kiln. I check every wire, every connection, pilots, switches, relays, the controller, and anything else in that box. Manual kilns will most likely have a Timer, made by Dawson. Almost

all kilns made up through the early 90's had timers and most of the time the tube assemblies need to be inspected. Are the cone supports there and functioning? The sensing rod is often bent and needs to be reset. Does the timer itself work? Does the claw, (The small metal hook piece that holds the metal latch in place), need to be reset. I make sure I take very good notes and even shoot photos on my phone to make sure I record the correct sitter model and tube style.

Note about inspecting wiring: Sometimes when I get in a tight box with a lot of old wires, I can do more harm than good. With really old wires that haven't been touched in years always handle with care. When should you replace old wiring? I test the wire by bending it slightly, this will show me if it is brittle or dried out. I also look to see if there is excessive oxidation or indications of heat loss at the connections. Have they been previously tapped up? Sometimes the best thing to do is nothing, if the wires have been working fine for this long, "don't fix what ain't broke."

Step 8: Check thermocouples

50% of the time this is your problem. Type K thermocouples, the standard on all kilns with a digital controller last anywhere from 75 to 200 firings, depending on what your firing and to what temperature you are firing to. I have a platinum Type S thermocouple that has been fired over 700 times and still going strong. Replacing your thermocouples should be done a lot like replacing the oil in your car. In this case preventative care is so easy and affordable. Although they are expensive, type S thermocouples can be ordered for any kiln.

Step 9: The kiln body

By now I have a good idea of the electrical problems. At this point I start checking the physical condition of the kiln. Starting from the top I take a look at the lid. Is it cracked or missing hardware from the lid hinge and lid support? Are the metal cases that hold the kiln together tight? How does the top layer of brick look, most of the time the top layers are worn. As that layer wears it will allow more and more heat to escape. Soft brick, over many years of use, will loose its ability to reflect heat. Remember hard brick will retain heat and soft brick reflects heat. I look for bricks they may have broken channels; these should be replaced since they make replacing elements difficult. Finally I check the kiln stand, is it still capable of holding your kiln? It should be a kiln stand not bricks or cinder blocks. Bricks will transfer heat to the floor which you do not want. I also check the position of the kiln, for instance is it too close to the wall or flammable materials.

Step 10: Venting

I check to make sure the vent actually works, I have found kilns with vents that sound like they are on but the blower blades are broken so no air is being transferred, or the blower motor is completely dead. I have also found many kilns with no holes drilled into the kiln or the wrong size holes.

Note about Vents: Do you really need a vent? This is often asked. There is no law requiring a kiln owner to use a vent. Common sense is your best guide here. If you know you are firing materials that have strong fumes, like metal, oils, luster glazes, decal, organic materials, waxes, etc. then get a vent. In my opinion, all kilns in schools should be vented An individual firing a few times a year in a roomy garage with a window probably does not need a vent. The vent and kiln manufacturers suggest that kilns fire more evenly and that the elements will last longer. This may be the case. Some people claim to get brighter colors due to the increased clean air or oxygen that is pulled through the kiln. If your kiln is in a tight spot, get a vent. If you are working near your kiln regularly, get a vent. If you are getting a headache in your kitchen while your

kiln is firing in the basement, get a vent. If you are concerned that the kiln room could heat up to the point where your sprinklers might go off, get a vent.

If I can't figure out the problem or I am unsure of what to do, I call the kiln manufacturer, or another kiln technician who may have come across a similar problem. Start with your local ceramic supply store, they may offer kiln repair services or know who to call. Remember your kiln is a specific piece of equipment like your refrigerator; you wouldn't call an electrician to fix your fridge. Educate yourself and get to know the inner workings of your kiln by replacing and element or repairing some soft brick. You can always feel free to call me with your questions. Good luck.

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