Blog No 13.1 or ....
THE SAGA OF THE SUITCASE KILN

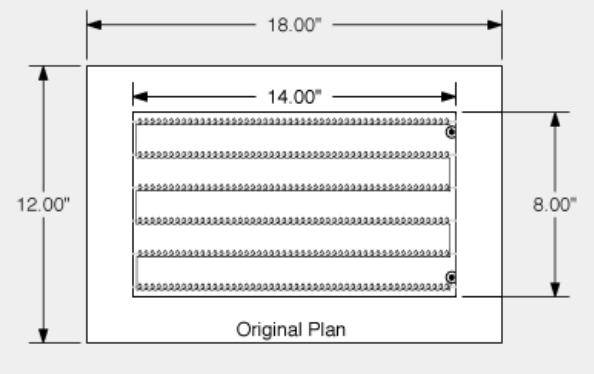

Fig.1 Illustration of the element layout, a single E120-12-165, was stretched and supported on 1/4" Mulite rods.

This was the original plan to have one element spread over the ceiling of this small slumping kiln we call "the Suitcase."
But, read on.....

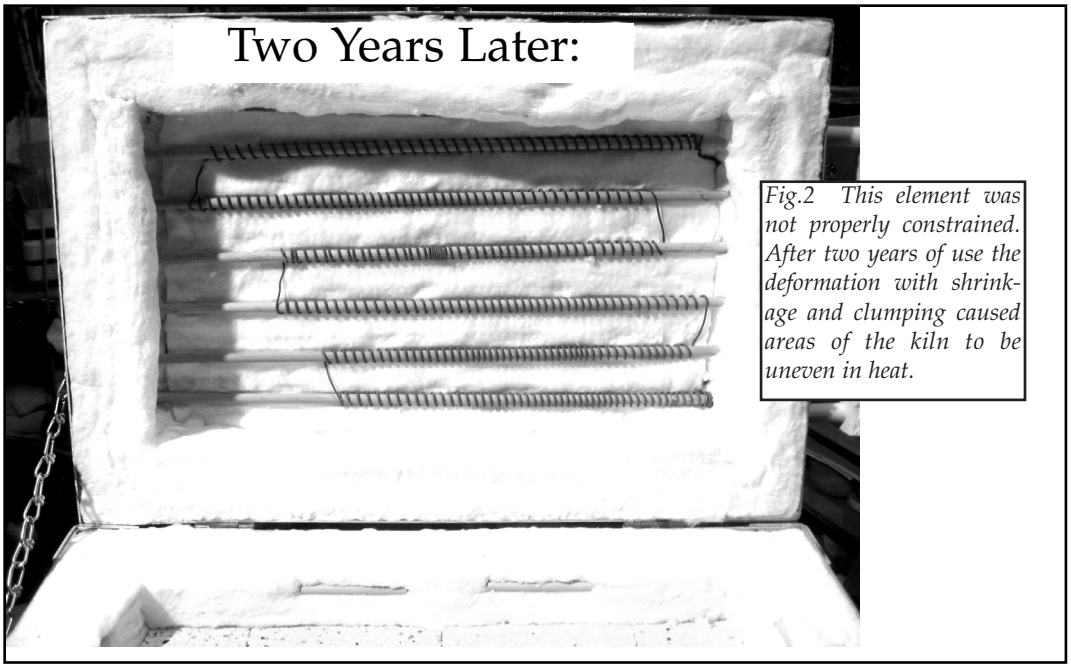

Fig.2 This element was not properly constrained. After two years of use the deformation with shrinkage and clumping caused areas of the kiln to be uneven in heat.

This kiln project really showed me what an unconstrained element would do. Every time this was fired up the element would get hot and the coils would expand some slight amount and when it was turned off, it would contract. And like glacial forces can move mountains, so the subtle effects of expansion and contraction pushed and pulled this element into a grotesque configuration which made parts of the kiln overheat while other areas were less so. A redesign was necessary. I needed a strategy which would hold the element from both ends on each of the rods so as to eliminate the horizontal movement of the coils. I call this solution a segmented element where I cut an E120-12.5-165 element into 6 segments with each end having a traditional double twist lead that exited the kiln to a connection board. This new element description I write as E120-12.5-165/6. Another way to express this is the overall element has 9.6 Ohm resistance so we make 6 sections each comprised of 1.6 Ohm.

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In May of 2014 I installed the 6 segmented elements.
Each element runs the length of the kiln and has two terminal endings as the leads goes through ceramic insulators called “thru-tubes” and the lead wires attach to a bolt on a connection board as shown in the images below:

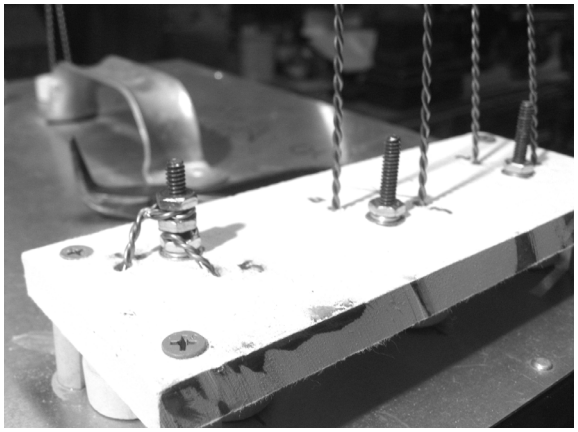


Fig 3 On this connection board we tie two element leads to one bolt stack and this forms a continuous single element of the six sections

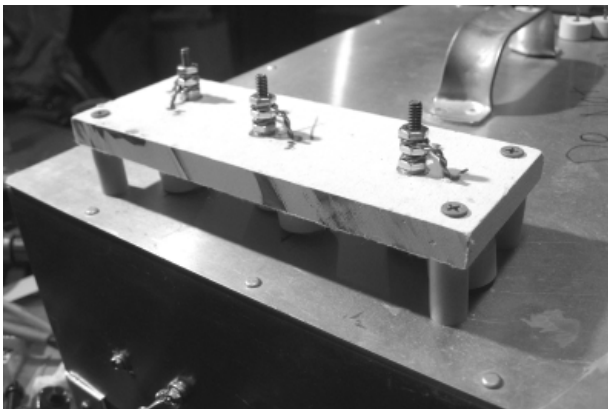


Fig 4 Another view of the same connection board as in figure. 3.

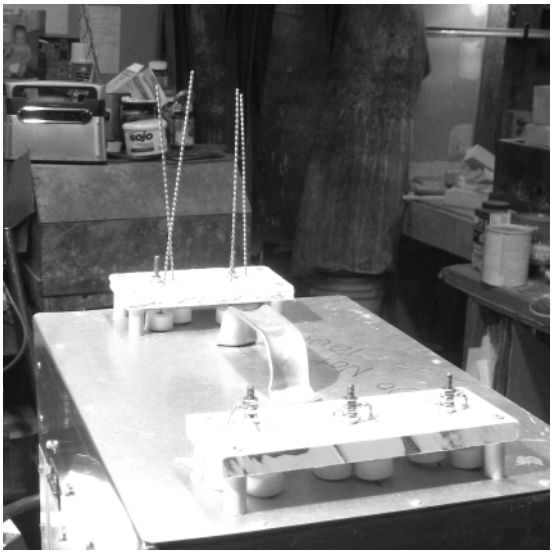


Fig 5 A view of the top of the kiln showing the two connection boards being wired up.

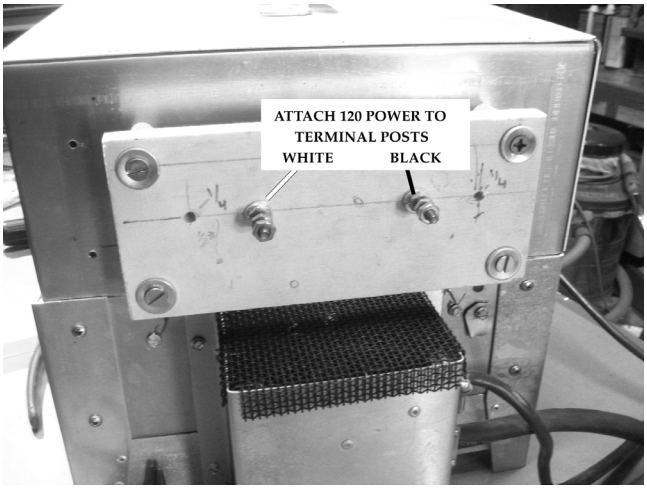


Fig 6 A view of the end of the kiln where the power is connected from the relay to the 120 volt element.

Success-

After eleven and a half years of service:

Fig 7 These are the element segments as photographed on November 2, 2025 showing the 100% success of this approach to this ceiling install in a fiber blanket kiln. I have not made a single adjustment in these elements in their 11-1/2 years of service.

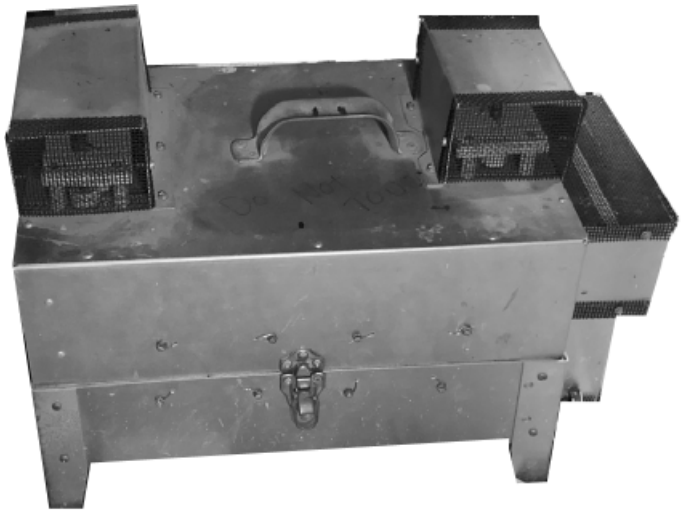


Fig 8 Exterior of kiln after 14 years of full use including 10 years as a high school teacher's accessory. It is now used in the Joppa Studio as a parts kiln.

This is really what this Blog is about:

The limits of power in the 120 volt circuit or how big a kiln can I fire on 120 Volt AC power line?

Most homes in the USA have 120/240 VAC power supply, but the plugs in the utility rooms and wall sockets are limited to 15 amps. The circuit breaker has labels that say things like “Living Room Wall Sockets” or “First Floor Bathroom.” Usually this means that all the sockets in the first floor bathroom go to this breaker. {15 amps x 120 Volts = 1800 watts}. Lets say you are feeling chilly and plug in the heat lamp and the space heater for a toasty shower but when you plug in the hair dryer all the power shuts off. You popped the breaker. You went over the magic 1800 watts of power draw.

To avoid this it is suggested we only use 85% of the designed power potential. And if you are going to plug your small kiln into a 15 amp wall socket it would be a good idea not to pop the circuit during use as that would not be helpful, so we try to adhere to this 85% rule which means the most you should try to draw is 85% of 1800 watts = 1530 watts. That calculates to 12.75 amps.

So that is the back story on the choice of elements for this little glass working kiln.

The full on test is designed to see what the kiln actually does under maximum output. Jot down notes on the rate of climb and then put into a chart. It gives a good visual. The Suitcase kiln produces this profile:

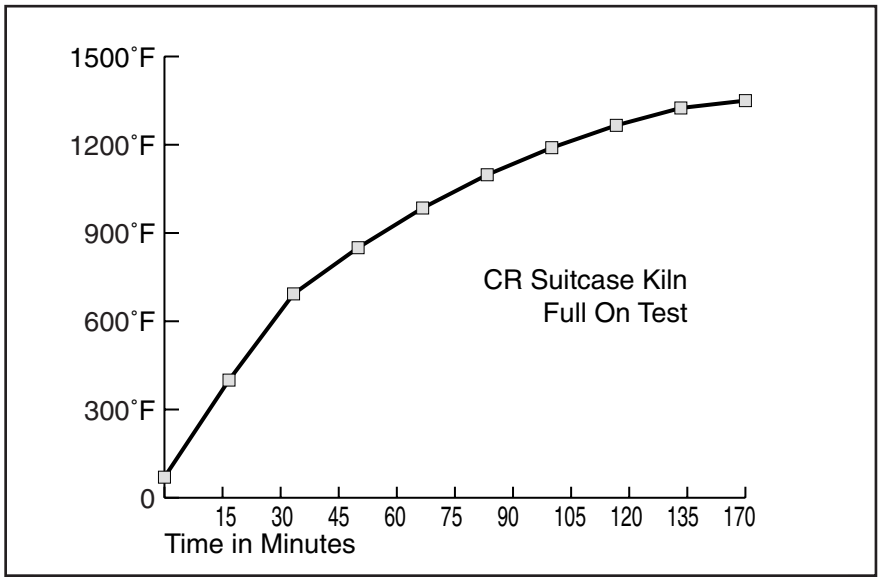


Fig 9 The Full on test. This kiln has many charted tests and programs that it has consistently performed going to 1400˚F in a three hour cycle.

In Conclusion: This kiln embodies the edge of what can be done with 120 volt circuit and glass heating technology. This kiln is safe to plug into any normal household circuit, but some of you want more. And lucky for you that is possible.

First, you should install a 20 amp line preferably using 10 gauge copper wire to your work station. Next we can spin up a set of heavier gauge sectional elements named the E120-16-155/6 and this will produce 1920 watts of power.

At this point caution is essential because this element has the ability to over heat your kiln. This of course can ruin the elements and the kiln furniture which would possibly leave you less than happy with this awesome approach. Over firing is not pretty, so if you really want to do this you must control this unit using a <good quality controller> and <reliable relay system>. And Joppa can help you with that.

We are now operating in the Realm of "Be Careful What You Ask For": Now you have a kiln that cannot be plugged into a normal household wall socket because you will definitely trip the breaker. Not only that, but a 20 amp/120 VAC plug is shaped differently. You now are the proud owner of a professional level kiln which will serve you well.

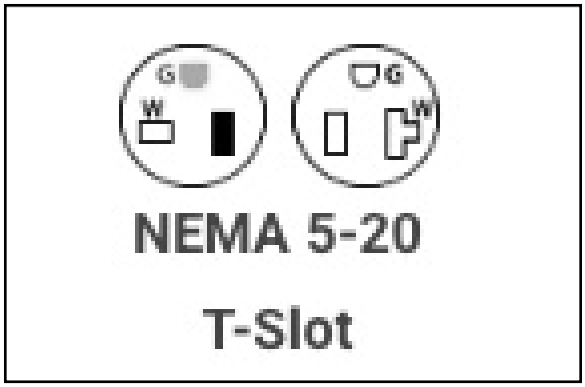
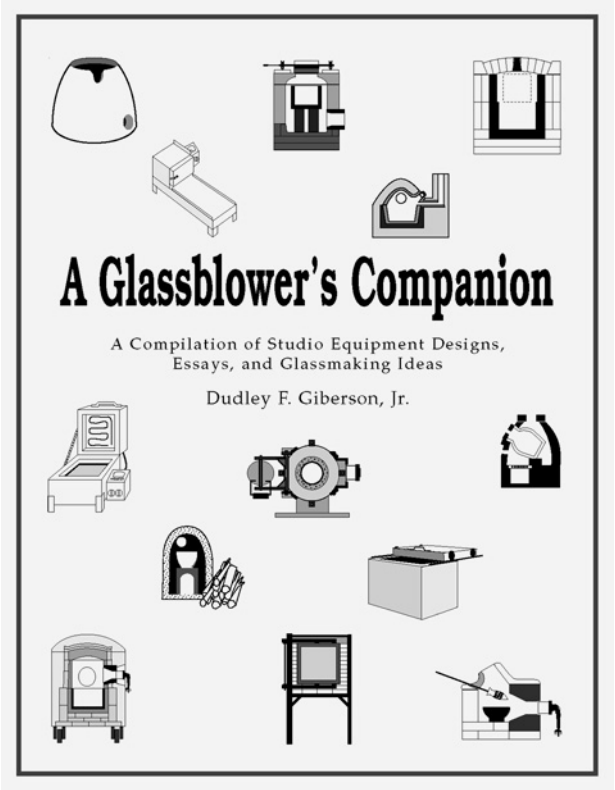


Fig. 10. This is the standard NEMA 20 amp x 120 VAC socket and plug needed to attach your new kiln element to the power grid

If you have questions, please give Dudley a call: 603-456-3569



And if you want to build a new piece of shop equipment and want some helpful ideas, get a fresh copy of Dudley's great text on building shop equipment,
A Glassblower's Companion, which sells for $35.00 plus Media Mail of $5.40

Please visit our web site at <www.joppaglass.com>