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INFORMATION SHEET

Trial by Fire

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In the last couple of articles, we looked at things to consider when buying a kiln. Now that you have a lovely new kiln in place, what's next?

Your first firing

If your kiln has never been fired before then it is advisable to perform an initial gentle conditioning firing. The purpose of this is to set the brickwork, drive out any residual moisture from the kiln and seal the elements with an alumina oxide layer which offers protection from volatiles produced in future firings. The first firing should be empty of ware, but should contain kiln furniture which could potentially contain excess moisture from storage.

Preparing your kiln shelves

Always spend some time applying batt wash to your new kiln shelves. This alumina mixture provides a barrier which can usually be chipped away and touched up in the case of minor glaze drips. You can minimise the risk of glaze drip damage by stilting ware, or designing your ware in such a way that any drips are caught before they reach the shelf.

Programming your controller

With a few pieces of terminology under your belt, most modern controllers are fairly self-explanatory. Regardless of this, do take the time to thoroughly read the kiln and controller manual before starting.

What is a program?

The program is a set of instructions that the controller communicates to the kiln to allow it to follow a particular firing schedule. During the firing schedule the kiln needs to fire at different rates. To enable this, the firing schedule is broken down into a number of different segments. Each segment is made up of 3 components:

- *Ramp* or rate: The increase or decrease in kiln temperature per hour.
- *Target temperature/ Set point*: The temperature the kiln is aiming to reach before moving to the next segment.
- *Hold/soak*: When the kiln reaches the set point temperature, this can be maintained for a period of time using the hold function.

The rate of temperature climb should ideally be between 100-140C throughout the firing. It is particularly important with bisque firings to start slowly (up to the Quartz Inversion Point ~573C where clay becomes ceramic) and to gradually 'ramp up' the rate of temperature change. If the firing is too fast, steam can build up too rapidly within the ware and lead to explosion. The kiln should always be left to cool naturally until the internal temperature is below 200C. Opening the kiln above this temperature can cause thermal shock damage to the elements and brickwork.

Ventilation

Good ventilation throughout the firing is essential – particularly for bisque firing, during which there are invariably high volumes of moisture and gas released from the clay. Any bungs should be removed and vents opened until the kiln reaches 600C whereupon they can be closed to conserve heat.

It's very important to ensure you are present to monitor the kiln towards the end of the firing. Electronic components, however sophisticated, should never be considered failsafe. If something should go wrong, you need to be there to switch off the power to the kiln.

The delay function offered by most electronic controllers is very useful in this respect, as you can calculate when the kiln needs to switch on in order for you to be present for the last hour or two of the firing. Often potters will set the delay so that their firing starts in the early hours and completes by mid-morning.

Programming a soak at the end of firings can be useful, particularly in a glaze firing as this allows the volatile glaze surface to settle down before cooling begins.

Typical bisque firing:-

Ramp 1 - 80C/hr Target 1 – 600C

Ramp 2 – 100C/hr Target 2 – 1000C

Soak/Hold 10-15 minutes

This firing should take about 11.5 to 12 hours.

Typical glaze firing:-

Ramp 1 - 100C/hr Target 1 – 600C

Ramp 2 – 120C/hr Target 2 – required glaze temperature

Soak/Hold 10-15 minutes

A 1060C (earthenware) glaze firing would take between 10-11 hours, and a 1260C firing between 12-13 hours, assuming the elements are performing optimally. As elements age, firing times become longer and this is a good indication of when to replace them.

Pyrometric Cones

You may hear reference to "cone numbers" and whilst modern controllers have relegated the use of cones to a retrospective diagnostic tool, some kilns still have analogue or manual controls where a cone is essential e.g. Kiln Sitter. Cones measure 'heatwork' as opposed to temperature which makes them a more reliable means of monitoring firings than pyrometers alone. They are calibrated to bend in a repeatable manner over a small temperature range (less than 4.5 degrees C usually) at a specified rate of firing.

They are normally used in threes – the required cone, with one consecutive number either side as a 'warning' and 'overfire' cone. Most potters set their cones up in a pat of clay with enough space in-between to allow each to bend freely, although cone holders are available to ensure the cone is set at the correct angle and spacing.