

Hobby Ceramicraft Box Of Knowledge
Tips, answers to frequently asked questions,
problem solving; a steadily growing resource for
you to delve into for answers to bisque, glaze,
firing, colour, kiln,,, and many more related
subjects.

Introduction.

Our experience is pretty large in this business, we have been around since the very beginning of the Contemporary Studio concept, and during all that time we have been *practising ceramists*; not just selling the materials, we have used, experimented, researched and constantly taught hands-on seminars and training courses.

It is very sad that so many of the questions and problems which arise in members studios, (as shown in the threads on the CCSA website, the ceramic studio's international meeting forum), arise from a lack of proper training.

When our whole industry depends on your customers being delighted with their magical, real, ceramic creations, it is so important that their items are always as near perfect as we can make them.

If we are just going to let them "stick the paint on the white stuff, dip it in a pink or blue liquid and stuff it in the kiln thingy", then sometimes it will come out O.K.

Frequently though it will not; it will be second rate!

Working like this may well earn some studios the "quick buck", but customers will not come back, and your reputation will soon suffer.

We owe our customers and ourselves a better deal than this!

All that is needed is a little more knowledge, and that is what this box will become full of, (and all for free!)

Some basic skills, useful tips, and advice on what to do when things do go wrong, (better still, how to stop it going wrong in future!)

Most of the contents you will find brief and to the point, **card one though is the exception!**

Many faults encountered all revolve around having a proper understanding of this **one basic subject**, shivering, crazing, breakage in the kiln or later, bisque which does not work properly, glaze which is erratic...

Grasp and understand this fundamental subject fully, and a great chunk of studios potential problems disappear at a stroke!!!

Everything, absolutely everything in the universe, when it gets hot expands, when it gets colder contracts.

Some things expand and contract a lot, some just a little, and others at all different rates in between.

Just how much or how little something does this is constant, can be measured, and called its "coefficient of expansion"

Now don't get turned off and think "this is heavy stuff"; it is not, it is simple, and it is *very very* important in our business of ceramics.

You mostly start with this white stuff called bisque, and coat it with a liquid mixture called glaze which, when fired, becomes glass. Simple!

The bisque has its' own coefficient of expansion, i.e. it expands and contracts at a certain rate.

The glaze when it becomes glass has its' own expansion rate or coefficient of expansion, (abbreviated as COE).

Successful ceramics depends on these two having *exactly* the same COE, whereby they both expand at *exactly* the same rate when heated, contract at *exactly* the same rate when cooled.

If for example, the glaze contracts on cooling more than the bisque underneath it, we get ***crazing***. This used to be a familiar fault, we all probably own items where this has happened. When dirt gets in the cracks they stain and the familiar network of craze lines show clearly. This can be attractive on ornamental pieces, but of course is unhygienic and not acceptable on utility items. (Where we want to purposely achieve this effect we use special Crackle Glazes with a known and *controllable different* COE.)

The crazing effect can be so severe that it will actually tear your item into pieces.

On the other hand, if the bisque contracts more than the overlying glaze, the glass becomes too big to fit on the bisque. This is called ***shivering***, small bits of glaze at the edges flake off, often even great sheets of glaze pop off, usually bringing any colour decoration with it, just leaving clean white bisque underneath.

Both these basic faults can happen immediately within the kiln, or else after hours, weeks or months later, depending on how different the coefficients of expansion are on the item.

So far so good, (or bad!).

The simple answer would seem to be, buy only our quality tested bisque and our excellent standardised glaze, and all will be well.

Basically, that is good advice, but I believe you will really find it a considerable advantage to understand just a little more about this subject.

What effects and changes the COE?

Different clay bodies have different COEs, ***and*** the temperature to which that clay has been fired to change it into bisque, both effect its final COE.

Glazes can be made to change into glass within a wide range of COEs; that is how different clays are all able to be glazed, each with a glaze designed to have the same COE as that particular bisque body. (This is talked of as "having the correct fit".)

Our industry has grown out of the Hobby Ceramics business, and worldwide all suppliers long ago standardised on one COE for all the materials.

All clays we use, when correctly fired, become bisque with exactly the same COE as the industry's correctly fired glazes.

The right clay.

Lesson/ be sure the clay is correct, trying to use other clays and bisque probably will spell disaster, (unless by pure chance it happens to have the same COE).

Usually this problem occurs when a customer wants to paint their own brought in item, or where your bisque supplier has purchased "cheap" bisque from some uncontrolled manufacturers in Asian or eastern block countries. (Once a common problem, less so now, but still sometimes happens).

Correctly fired bisque.

As the clay is fired into bisque its COE changes. This means that firing it higher or lower than its' design temperature will alter its' final COE. *This is where a little knowledge becomes dangerous!*

It is often heard that our bisque should be 04 bisque, (fired to cone 04), and that if you suspect a batch is underfired, all will be well if you first refire it to 04.

It ain't necessarily so!

Most original American clay bodies on which the industry started were intended to be bisque fired to Cone 04 (around 1060 Centigrade), the glaze fired to Cone 06 (around 1,000 C).

BUT, many of the higher quality Italian brands are designed to achieve the correct COE when bisque fired to a lower Cone 05 (about 1,035). Refire this to 04 and you will be upsetting the COE.

All our bisques are designed to be glaze fired to Cone 06.

Lesson/ do not refire your bisque above 05 unless you are sure it is correct to do so.

(Dirty, greasy, or stained bisque can always be safely 06 fired to clean it if necessary.)

For the advanced enthusiast.

Knowing that the bisque firing temperature affects the COE means that if you really want to use a different earthenware clay, you may be able to get it to the right COE by experimenting with different firing temperatures. It usually means a large number of disappointing failures before you get it right, but it can be fun for instance with a local clay body.

One sample I tested needed to be bisque fired to 1120 C to get even close to success.

The right glaze, and correctly fired!

The glazes we use, as I have said, are designed to become glass with exactly the same COE as the bisque we use, **when correctly fired.**

Lesson/ The answer is invariably on the glaze label, and is almost always to fire to a Cone 06 firing.

More about firing on a later card, but for now just accept that this means to about 1,000 C at a medium speed, i.e. *around* 8 hours total firing time.

It also means that for success you **must** use an industry standard glaze. *Of course ours are the best*, but in practice it means one made by Hobby Colorobbia, Mayco, Duncan or Gare.

Playing with clay, add-ons, rolling and stamping clay, clay footprints etc.

Any of the above can be interesting additions to your business, great fun too, but now understanding more about COE, you will realise these could bring problems.

Lesson/ Use the right clay, we stock 25kg blocks of Italian clay exactly the same as used in our Italian bisque, and fire it to the correct temperature, in our case Cone 05, and all your usual colours and glazes will have the correct "fit" on the bisque you make.

If you want to try pouring your own bisque from moulds, we sell the slip (liquid clay) made with the best Italian clay mix, and tell you how to fire it to get the right COE

Conclusion

So there you are, simple really isn't it?

If your bisque expands and contracts at exactly the same rate as the glass (glaze) which covers it, all will be well.

I.E. it means they both have exactly the same COE (coefficient of expansion).

COE of the bisque depends on the clay mixture and also the temperature and speed the bisque was fired at.

COE of the glass, or glaze, depends on its manufacture as well as its correct firing temperature and speed.

Doing anything which alters either COE spells instant, or delayed, problems.

Get it right and probably half of the most common studio problems will not trouble you, and that means happy customers!

John Sheppard. 2007.