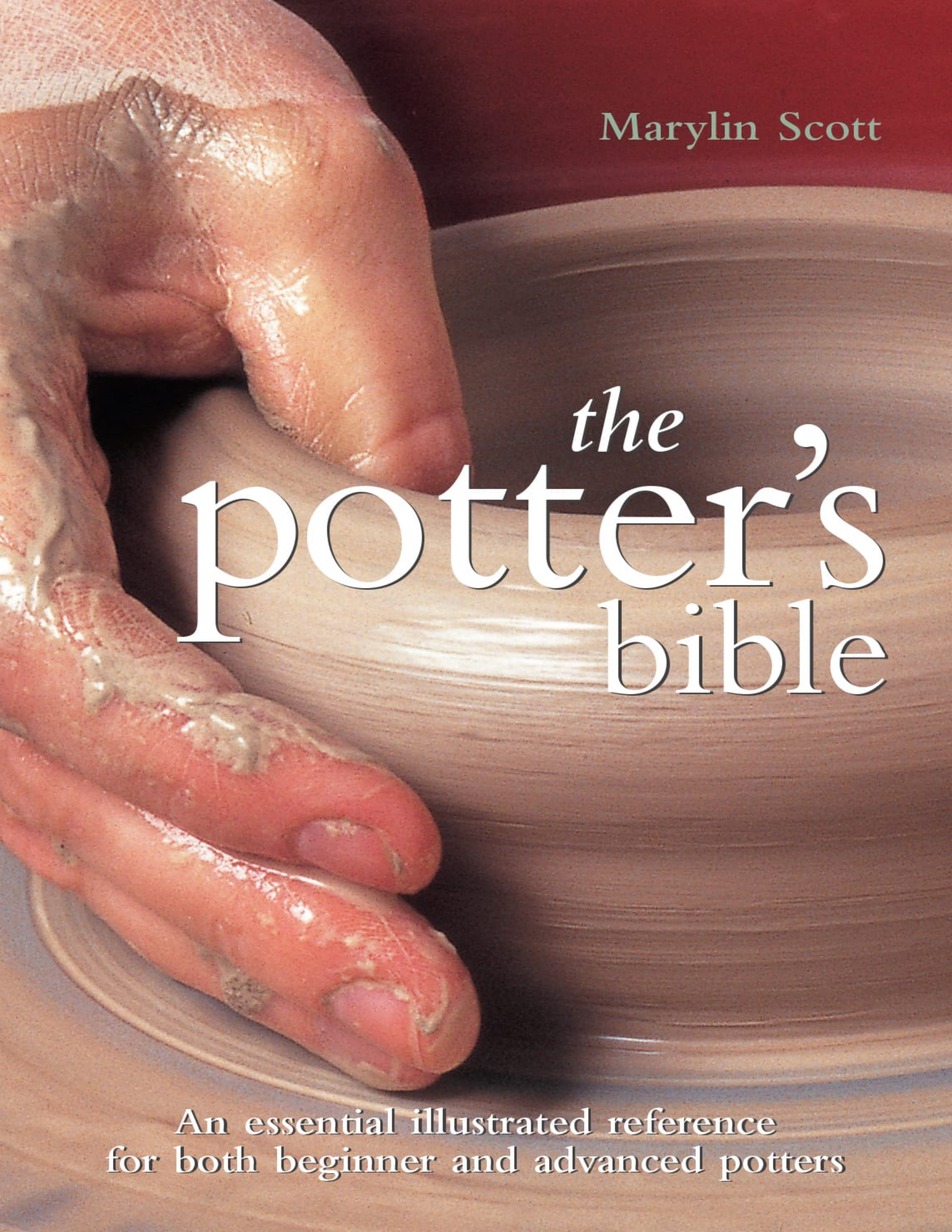
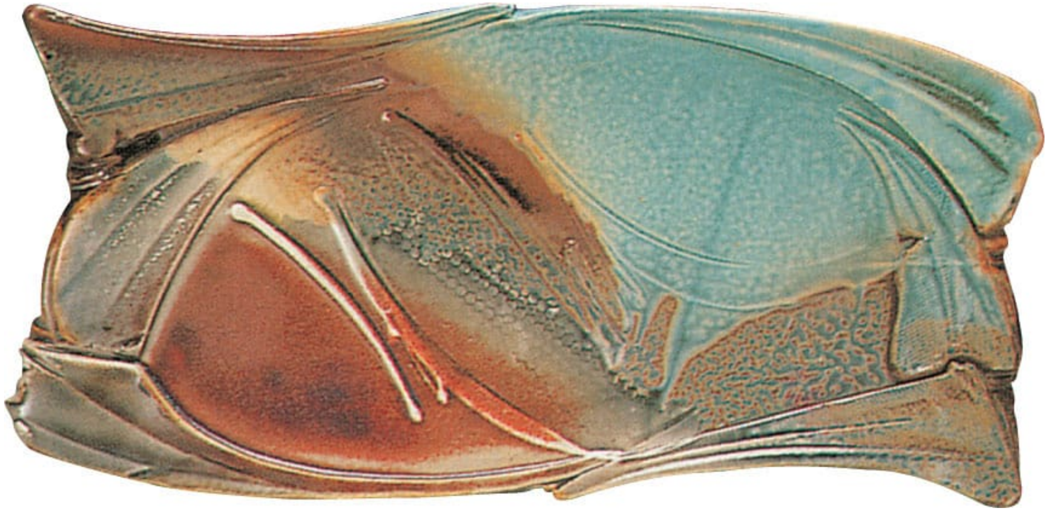


Marylin Scott

the potter's bible

An essential illustrated reference
for both beginner and advanced potters




THE POTTER'S BIBLE

An essential illustrated reference for both beginner and advanced potters

Marylin Scott

CHARTWELL BOOKS

CONTENTS

Introduction

Clay objects have been made for as long as the human race has existed, with functional vessels for storage making their appearance at the same time as the development of agriculture. Many of these pots were decorated in various ways, and in most early societies the potters were held in high regard. In China, Japan, and Classical Greece, pottery became a true art form, clays became ever more refined, and new glazes, decorative techniques, and firing methods were discovered, many of which are still used today.

Unique characteristics

Clay is unique in its ability to be molded by hand into objects of beauty that become permanent when exposed to great heat. This wonderful natural material allows artists to create both functional and purely decorative work—the possibilities are more or less endless. Nowadays we are fortunate in being able to draw on a store of knowledge passed down through the centuries, which is continually being added to with new experiments and technical developments.

Getting started

The only real problem with taking up pottery for the first time is that unlike many other arts and crafts it does require both space and some equipment—you could only make very small clay objects on a kitchen table. But in fact, provided you have a working space, or access to one, you don't need a lot of equipment to make a start. Although the word pottery usually conjures up an image of throwing on the wheel, many fine and sophisticated pots can be made by hand-building methods such as pinching and coiling, which require little equipment, and finished pots can often be sent out to be fired—or you can build a sawdust kiln in your yard.

But this book is not primarily aimed at the beginner, although those new to the art, or thinking of taking it up, will find a great deal of useful information. As the title implies, this is a comprehensive manual for the practicing potter, dealing with every aspect of the art from selecting and preparing clay through forming and decorating methods to glaze recipes and firings.

About this book

The book is divided into six chapters: Clay and Pottery Bodies; Forming Methods; Texture and Pattern; Painting and Printing; Glazes and Post-Firing Techniques; and Technical Resources, enabling the reader to quickly find the information they need. Each chapter is illustrated with step-by-step demonstrations of a particular technique, with cross-references to further information about related methods and materials. A carefully chosen selection of finished pots by professional artists shows how individual potters express their ideas through the medium of clay, and an important bonus is the final chapter, which contains several pages of glaze recipes, valuable information on different firing methods, and a glossary of pottery terms.

With its combination of practical advice, exciting images and inspirational ideas, this book is a must-have for all potters at any stage of their career, from beginner to professional.

Hand tools

It is not necessary to spend a lot of money on tools, as a few basics will suffice to begin with. One throwing rib, one sponge, a wire, and a ribbon tool are all you need initially. Many pottery tools can be made at home, which is not only inexpensive but also rewarding because you can make the exact shape that you require.

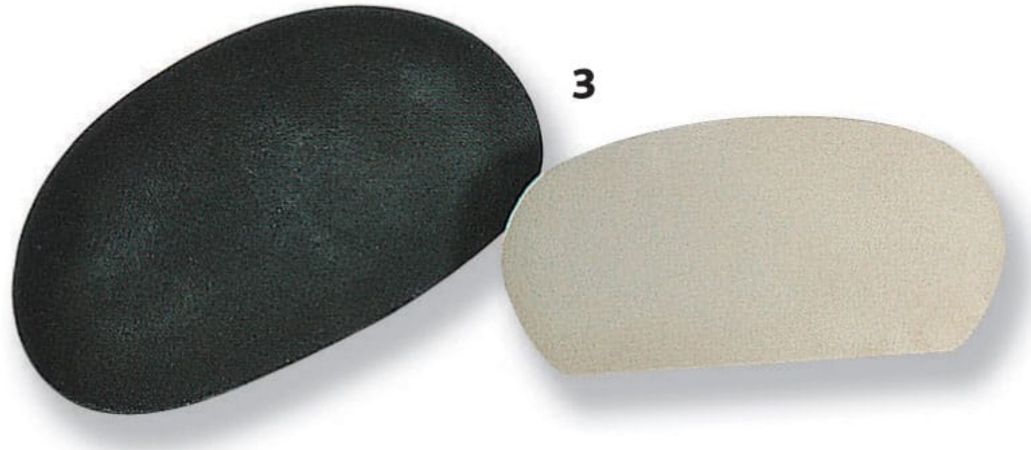
Illustrated on these two pages are the most commonly used tools for throwing. Brushes and other implements for decorating pottery are shown in the relevant chapters. As you gain experience you will discover which are the best tools for you and the job in hand. Every potter has their own toolkit, containing a mix of handmade, modified, or shop-bought tools.

1

Craft knife
(1) A craft knife is always useful to have to hand and can be used to trim clay or to cut decoration.

2

Hole cutter
(2) These are used to cut circular holes in leather-hard (part dry) clay, such as strainer holes in teapots.



3

Kidneys

(3) Kidneys can be used to either smooth the surface of wet pots or to remove clay during turning when the pot is leather-hard (firm to the touch, but still damp). They are always made from metal, but come in different shapes and thicknesses.

4

Sponges

(4) Natural or man-made sponges are used to remove water from pots, smooth rims, and clean surfaces. Most potters have a selection of sponges.

Bamboo tools

(5) These are used for sealing joins in pots and for creating different surface textures. They can also be used to model clay.

6

Callipers

(6) These are most often used for measuring the width of lids and galleries. They can be set to a particular width and put aside until needed later.

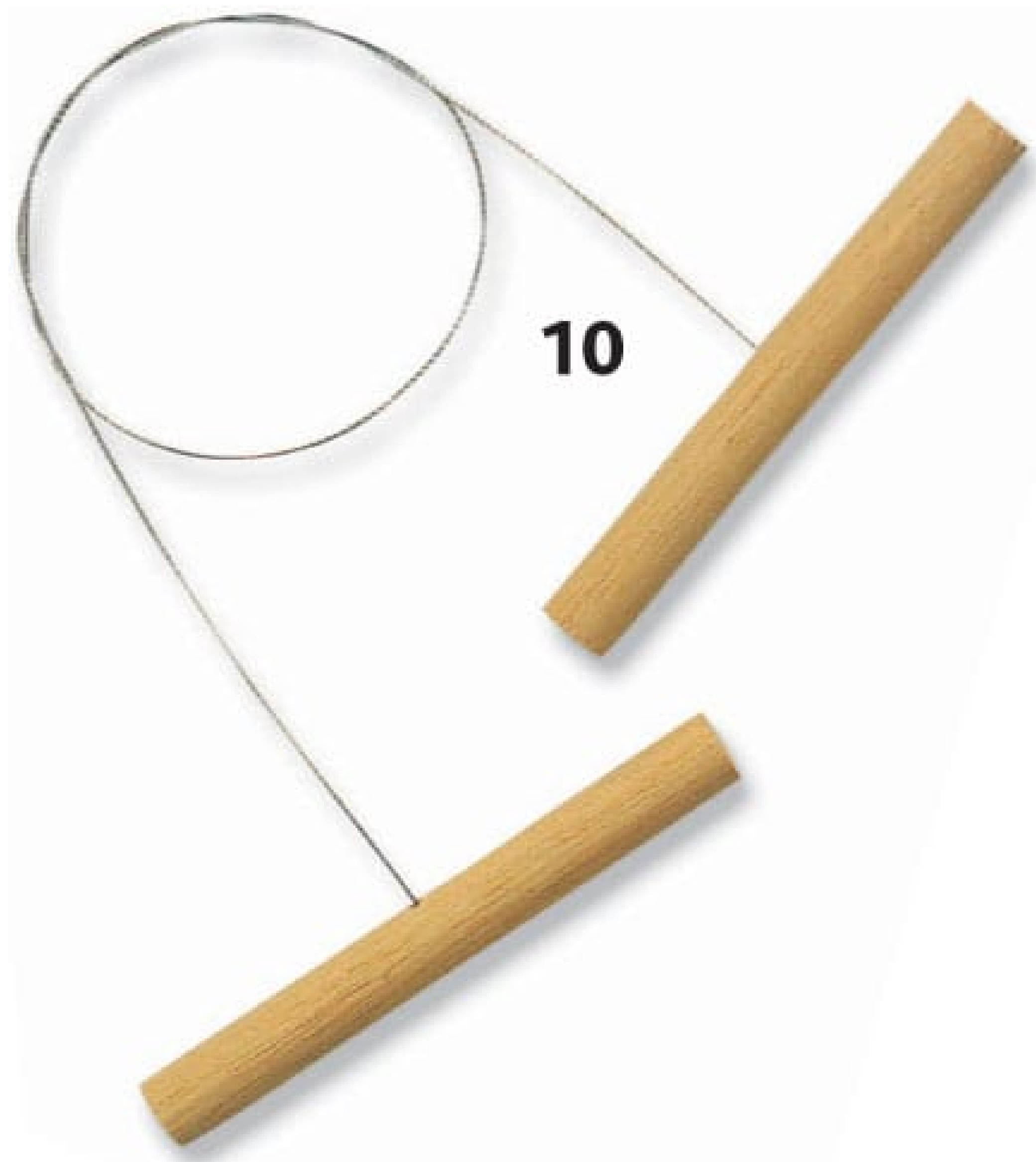
Sponge on a stick
(7) A practical tool used to remove water from inside tall or narrow forms to avoid distorting the form with the hands.

Paint scraper

(8) A household paint scraper is a useful tool for cleaning benches and boards. It can also be used to remove wooden bats from the wheel, clean the wheel head quickly, shape wet clay, and to create a bevel under a wet pot.

Ribbon tools

(9) These are so called because they remove ribbons of clay from leather-hard pots during turning. They are metal loops on a wooden handle and come in many different shapes.



Wire
(10) A wire is used to cut through clay, either during wedging or when removing pots from the wheel. The wire can be metal or plastic, but should have wooden toggles on either end to grip.

11

Throwing ribs

(11) Throwing ribs can be made from wood, metal, or plastic. You can make your own from old phone cards or buy wooden ones from suppliers. They are used for smoothing and shaping pots on the wheel.

Studio Equipment

Studio equipment is obviously more expensive than hand tools, but there are a number of items that are essential. All potters need a kiln, and those who wish to throw pottery will need a wheel. Whether you need other studio equipment will largely depend on the amount of work you intend to produce, but don't buy expensive items until you are sure you will use them.

Throwing wheels

Throwing wheels are available in three basic types: kick wheels, momentum wheels, and electric wheels.

Kick wheels

(1) Made of wood or metal these are usually propelled by a pedal or crank shaft operated by the potter's foot spinning a flywheel.

2

Momentum wheels

(2) Momentum wheels usually have a large, heavy flywheel powered directly by the feet or rotated with a stick placed in a notch on the wheel-head.

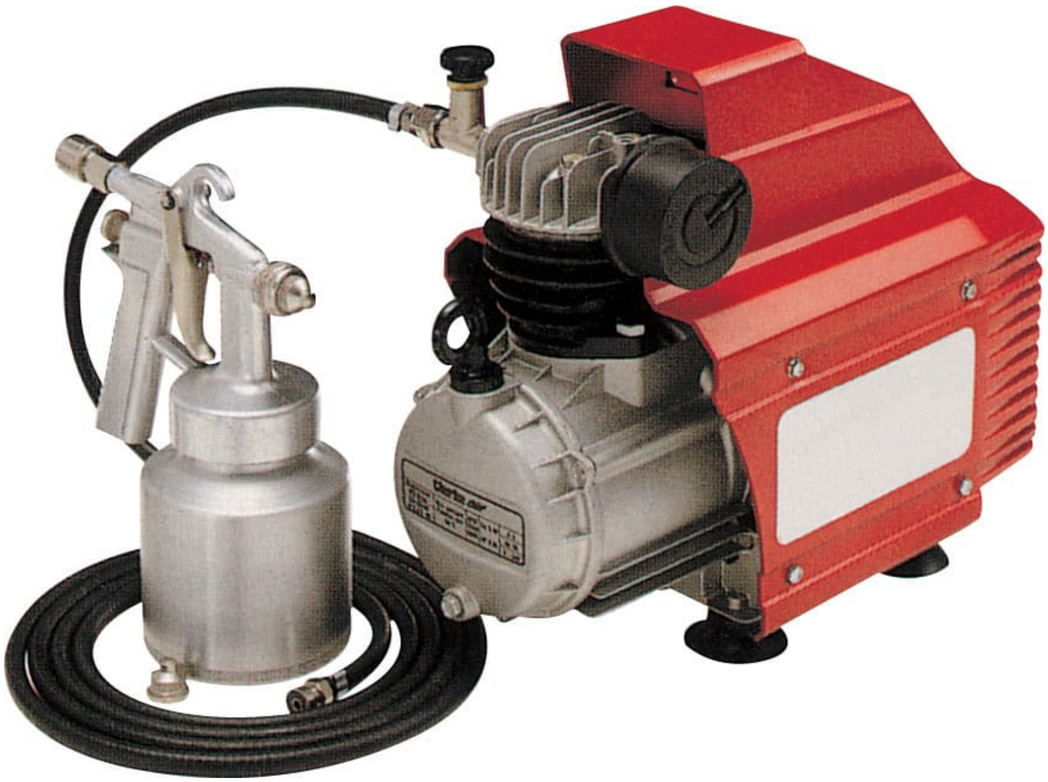
3

Electric wheels

(3) These come in a variety of sizes. Some are large with integrated seats, and others small and adjustable in height, with remote foot pedals.

Kilns

Kilns are the most essential piece of equipment in a pottery studio. Electric kilns are obtainable in a range of sizes, from small mains-operated hobby kilns to large commercial ones. Gas kilns are useful if you wish to fire reduction stoneware. Front-loading kilns are easier to pack, but top loaders are usually cheaper.



Spraying equipment
Spraying equipment is needed if you intend to spray glazes or colors, in which case a good-quality spray gun and compressor will be essential. Compressors come in various types, some with air reservoirs and some with only a direct feed to the gun.

Banding wheels
Banding wheels are used when coiling, hand building, and decorating. They come in different sizes and weights.

CHAPTER 1

CLAY AND POTTERY BODIES

There are many different types of clay, some more suitable for throwing and others for hand-building methods, so your choice will to some extent depend on the kind of pots you wish to make. This chapter will help you to make decisions about the basic raw materials as well as providing hints on coloring, preparing clay, and improving its working qualities with common additives.

Natural clay

All pottery is made from a very common and naturally occurring material that can be found in significant quantities virtually everywhere on the earth's crust. Clay becomes ceramic when it is exposed to extreme heat, which fuses the particles together and hardens the body to produce a stable material that is often more permanent than rock itself. Before firing, however, it is a highly malleable substance, and its most important quality, plasticity, allows it to retain its shape when molded, leaving the surface smooth and unbroken. The clay's handling strength will depend on the amount of plasticity, and it is only by discovering how it responds to bending, rolling, pulling, and pressing that you will be able to make an informed choice.

Clay falls into two geological categories: primary, or residual clays, and secondary, or sedimentary, clays. The former, which are rare, are those that have remained in their forming ground, while sedimentary clays have been eroded and carried away by water and earth movements to be deposited in sedimentary layers.

Primary china clay is very pure but is non-plastic due to its large particle structure. The weathering process undergone by secondary clays makes them more plastic because exposure to the elements has helped to break down the particles. However, it is rare for any natural clay to be used on its own, the addition of other raw materials being usual to achieve a workable balance of plasticity, shrinkage, firing temperature, and strength.

Assessing plasticity
Assess clays for plasticity and their working qualities by rolling coils and bending them into tight loops or circles. Heavily grogged clays will split and open easily while the more plastic ones will bend without any visible sign of cracking.

Stoneware clay

Seldom found naturally, most stoneware clay is a mixture of ball clay and other minerals added to give particular qualities to the raw or fired state. Usually gray in color, it will fire from buff to white.

Red surface clay

This is the most common natural clay. The iron oxide content gives it its characteristic color and also combines with the silica and alumina in the clay to help vitrification.

Fire clay

A refractory clay—that is, a clay that can withstand high temperatures. It fires to a buff color and can be used on its own or added to other clays. It is also fired and ground into particles to form most types of grog.

China clay

This high-firing primary clay is non-plastic on its own, but it is a common component in clay recipes and glazes. Molochite, the vitrified form of china clay, is used as a pure white, stable grog in many clay bodies.

Ball clay

A fine highly plastic secondary clay, but too plastic to be used on its own. It fires white or off-white and is commonly used in glazes and is an ingredient in porcelain and stoneware bodies and decorating slips.

Bentonite

A clay-like mineral added to clay bodies and bone china to increase plasticity. When used in small percentages in glaze mixtures, it helps suspension of the particles.

Powdered clays
These dry powdered clays can be used to mix your own clay.

Further Information

Testing clay, pages 16–17
Clay additives, pages 30–31

Testing clay

Whether clay is dug from the ground or mixed from purchased raw materials, the process of preparation and testing is the same. The main testing is done to ascertain four properties—plasticity, shrinkage, porosity, and firing temperature.

Test for plasticity as shown on page 14. The porosity of fired ceramic is extremely important because it dictates the amount of glaze that will be absorbed during decoration. Fire some samples to bisque temperature to see how much glaze is soaked into the body. The porosity of the clay will also affect how well the glaze adheres to the clay.

Some clays melt when fired to higher temperatures, especially those dug from beach deposits because concentrations of iron oxide and salts from the seawater act as fluxes, lowering the melting temperature. Other clays can withstand temperatures up to 2550°F (1400°C) before maturing. When testing for firing temperature, make sure any clay samples are placed on scrap pieces of broken kiln shelf in case they melt and run onto other work or kiln furniture.

Preparing a sample

1 These chunks of clay were dug from the ground and contain many impurities, including stones, vegetable matter, and insect life. Allow the clay to dry thoroughly before breaking it up.

2 Mash the rock-like clay into smaller pieces with a hammer or mallet, then crush it using a heavy rolling pin. Place the crushed clay in a bowl and add water until the clay is just covered. If you are making clay from powdered raw materials, weigh out the ingredients, mix them together in a bowl, and cover with water.

3 Allow the clay to soak until it has become very soft. This will take less time with a grogged clay (see page 30) than it will with a more refined clay. Pour off any excess water and mix the clay into a thick paste.

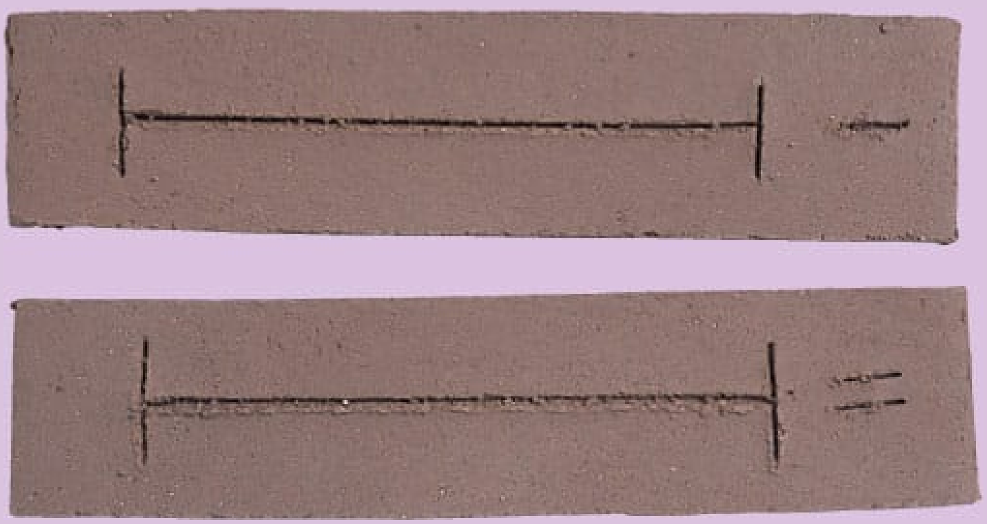
4 Add more water to make a creamy slip then pass the slip through a small 80-mesh sieve. If necessary, use a flat stick or rubber rib to push any lumps through.

5 Pour the sieved slip onto a plaster bat and smooth it out. The slip will stiffen fairly quickly and will need frequent turning on the bat to stop it from hardening too much.

6 Peel the stiffened clay from the plaster bat, pressing the clay down onto the slurry to pick up any residue. Wedge and knead the clay to homogenize any differences in consistency (see pages 34–35).

Testing for shrinkage

Clay shrinks in three stages. First when it dries out; second when it is bisque fired; and third when it is fired to its top temperature. The majority of shrinkage occurs at the bisque-firing stage. To test for shrinkage, roll out some sample pieces of clay into 6-inch (15-cm) long strips and scribe a 4-inch (10-cm) line down the center of each one. Measure the scored line after the clay has dried, after bisque firing, and after firing to its top temperature to assess the percentage of shrinkage in the clay. It is a good idea to score some small identification marks in the samples so that you can distinguish one from another.



Measure the lines at each stage of shrinkage.

FURTHER INFORMATION

Assessing plasticity, page 14
Adding grog, page 30
Preparing clay, pages 34–35

Earthenware

Earthenware pottery has been made since the earliest times, the commonest form being the familiar terracotta clay, used to make a wide range of products, including bricks, drainage pipes, and roof tiles. Terracotta is an Italian word meaning “fired earth,” and when fired, terracotta clay is relatively soft and porous. The red color comes from the presence of iron oxide in the clay body, and the greater the percentage of oxide, the richer the color. The oxide content also contributes to the low firing temperature required to mature the clay.

Throughout history terracotta has been favored for domestic and culinary use because it has good resistance to thermal shock, especially over open fires. The porosity of the body also allows evaporation through the surface, keeping any liquid contents fresh and cool in hot climates. In colder regions, however, garden pots may be prone to frost damage and cracking when water absorbed into the clay freezes and expands.

Earthenware pottery is usually fired to 1830–1980°F (1000–1080°C). Adding sand or grog (see page 30) will allow the clay to be fired to higher temperatures, giving a more fused finish and decreasing the pot’s porosity. Generally speaking, the higher you fire earthenware clay, the more resistant it will be to glaze crazing and the better suited it will be to domestic use.

Both red and white earthenware are ideal for slip decoration (see page 100). Most traditional peasant pottery is decorated in this way, with motifs of painted slip or vigorous finger-wiped patterns. Traditional African pottery is earthenware and very low fired, usually only to 1470°F (800°C), and often has impressed decoration.

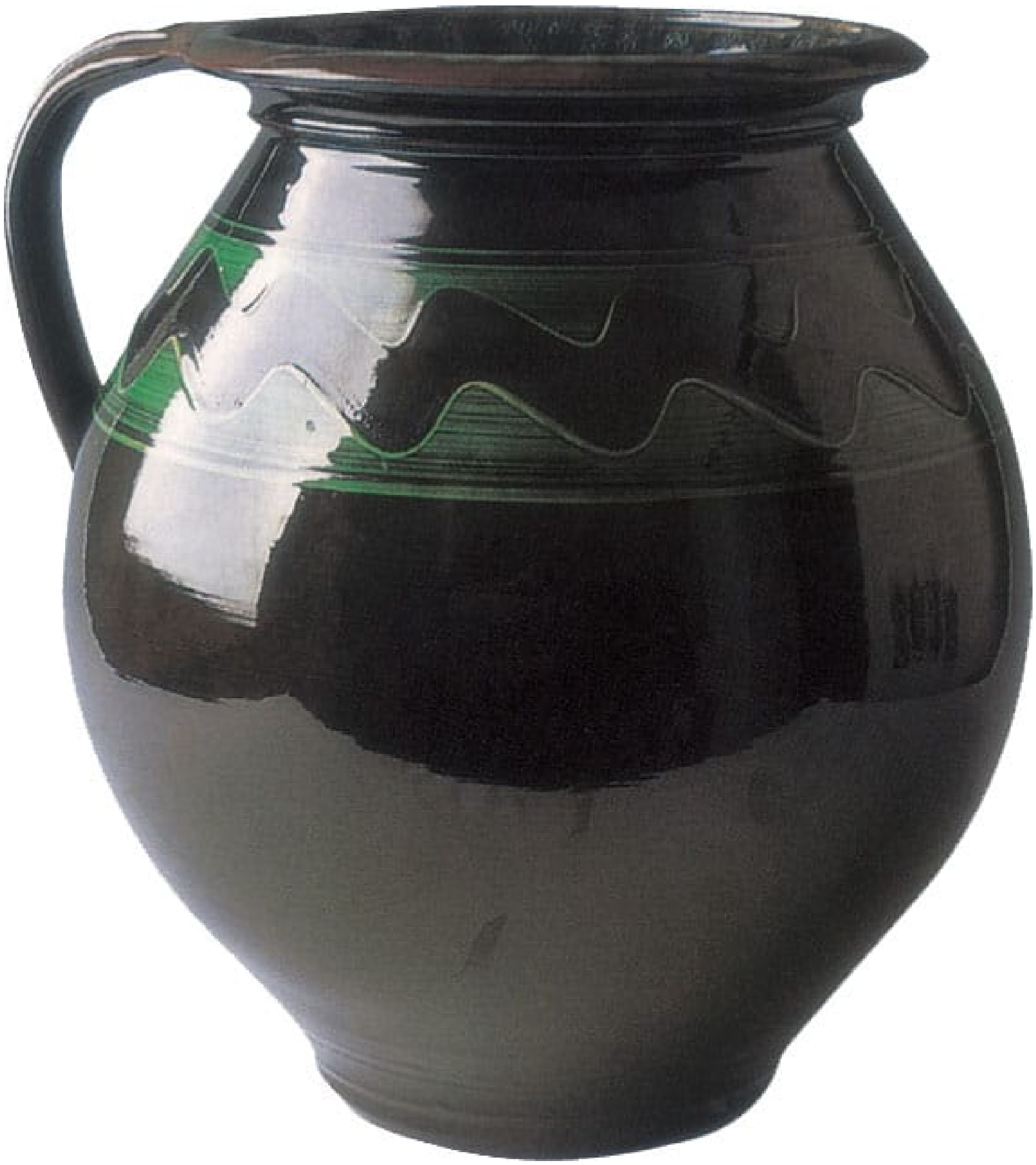
Red earthenware contains a small percentage of fine sand. This makes the clay slightly stronger, especially when throwing, allowing larger pieces to be made. It does not have a great deal of resistance to warping, and is therefore not suitable for large, flat work. It does, however, have a reasonable fired strength at the lower temperature range, and is best suited to coiling and thrown pots. Bisque fire to 960°C (1761°F); glaze fire between 1060°C and 1120°C (1940°F and 2048°F).

White earthenware, made primarily from a mixture of ball clays (see page 15) with the addition of other minerals. When fired it is a white or buff color, which is well suited to decoration and is much smoother than red, having no sand or grog added. It is not suitable for hand building, and has little resistance to warping. Bisque fire to 1000°C (1832°F); glaze fire to 1120°C (2048°F).

Slip-trailed platter
Many potters endeavor to continue the earthenware tradition, making robust, functional pottery with a fresh and contemporary approach. This magnificent platter by Clive Bowen has the vigorous, enthusiastic slip decoration typical of this master earthenware potter. It was raw glazed and fired in a large wood-fueled kiln to 1900–1940°F (1040–1060°C).

Round dish with feet
This dish by Michael and Victoria Eden was thrown with a soft, red earthenware clay, and the form was altered when leather-hard by slapping the base on a board to cause the end to turn upward and the shape to become oval. The lively feet and handles were created by pulling looped wire tools through slightly stiff clay. Colored transparent glazes give the dish a shiny, juicy surface.

Country slipware
Traditional earthenware pottery was made in the famous Buckley and Ewenny Pottery in Wales for hundreds of years, finally dying out in the 1940s and 1950s. Virtually every household in the country would have had some pieces.



Traditional shapes
Atilla Albert's large pitcher is a traditional shape from southern Hungary. The village of Magyarszombatfa still has 15 pottery families working there, producing ware for domestic use. Atilla Albert now fires his work in an electric kiln, the only one in the village, which gives him cleaner glaze finishes.

Further Information

Slip decoration, pages 100–101
Slip trailing, pages 106–107
Majolica, pages 134–135

Stoneware

Stoneware bodies are composed of mixtures of clays, minerals, and sand or grog (see page 30). After a high firing, its density and weight give it a stone-like feel—hence the name. Its durability, strength, and low water absorption rate make it ideal for domestic ware and pieces for outdoor use, while fine stoneware clay is excellent for functional pottery such as pitchers, plates, and dishes because the particles of clay fuse at high temperatures, giving a hard, smooth finish.

Although stoneware clay matures at temperatures between 2190° and 2370° (1200–1300°C), when it becomes fused and impervious to water, it is common to fire it at lower temperatures. The main criterion for selecting a particular stoneware clay will be the type of firing you intend to use: oxidized or reduction firing (see page 175), as the latter produces changes in the color of the clay.

A typical stoneware body can be composed of fire clay and ball clay, with the feldspar content varied to achieve different maturing temperatures. The more feldspar you add, the lower the temperature required. A low-temperature stoneware clay can be achieved by substituting a frit for the feldspar content. Replacing some of the fire clay with china clay and using a light-colored fire clay will produce a white-firing stoneware clay.

Buff stoneware
has a small addition of very fine grog, making it suitable for throwing, press-molding, and coiling. The buff color depends on the percentage of iron in the body and, although appearing gray in its raw state, develops its light, cream color during firing, as organic materials burn out. If more iron is present, the clay will be pinker after firing. It has a slight resistance to warping. Bisque fire to 1000°C (1832°F); glaze fire between 1120°C and 1280°C (2048°F and 2336°F).

Grogged white stoneware

The addition of grog (see page 30) increases the warp resistance, making this clay suitable for throwing and most hand building. It fires a light gray to white color, depending on the temperature. Because the grog particles scratch the surface to some extent, it is not really suitable for burnished pottery. Bisque fire to 1000°C (1832°F); glaze fire between 1120°C and 1280°C (2048°F and 2336°F).

Jar

By altering the form of the pot while still fresh on the wheel, Ashley Howard has given this stoneware jar a fluid feeling that complements the soft quality of the glazing. A copper slip glaze was thickly applied to produce a deep mauve/purple color.

Flat vessels
These vessels were thrown without bases, then squeezed to flatten their shape and added to flat, thrown bases. Made from red stoneware clay, they were fired to 2230°F (1220°C). Emily Myers's work conjures up many references to landscape and the natural world, not only in her choice of form but also in her mastery of dry barium-glazed surfaces.

Geometric dish
Charles Spacey has used a subtle range of ash glazes to create the geometric patterns on the interior surface of this stoneware dish. All of Spacey's pieces are formed by draping the soft clay over cut wooden blocks, a variation of the press-molding technique (see page 52).

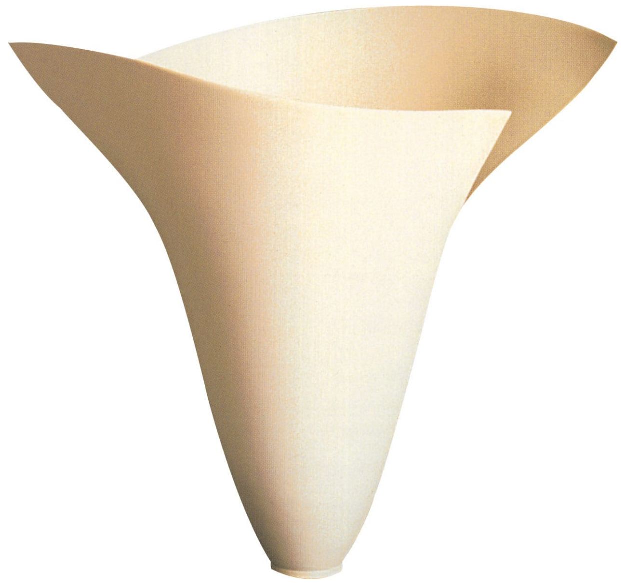
Deep platter
Suzy Atkins's platter is made from stoneware clay with 15 percent fine grog added and is decorated with areas of slip superimposed on a base slip. Decorative areas were defined by a wax resist and the piece was then salt glazed, so that shinier parts were created by greater exposure to the salt vapors. Impressed marks in the clay are emphasized by gold luster.

FURTHER INFORMATION

Coiling, pages 42–43
Press molding, pages 52–53
Using resists, pages 116–117
Lusters, pages 142–143

Porcelain

Porcelain is usually white in color, fine in texture, and has a beautiful translucency when thin. A typical porcelain clay is fired at temperatures in excess of 2340°F (1280°C) to achieve the characteristic whiteness and density. Fired porcelain has incredible strength and is extremely durable. However, porcelain clay bodies are the least plastic and the most difficult to throw and hand build because the working time is critical, with a narrow margin between the clay being too soft and too dry. Porcelain pots must be handled with care before firing because they have very little strength, and they also require careful preparation before firing or they can deform and crack easily. But in spite of all the apparent problems, many potters do use porcelain to great effect.



Natural forms
The title of this thrown and cut porcelain form by Elsa Rady is "Lily," confirming its obvious links with natural flower forms. The work's simplicity of form, emphasized by the simple white glaze, almost disguises the technical achievement involved in throwing it.

Porcelain is usually given an initial low bisque firing to 1830°F (1000°C) to make it easier to handle while glazing and decorating, then fired again to full maturation. While the distinctive look and feel of porcelain can be reached at temperatures as low as 2160°F (1180°C), it only develops its clarity and translucency at high temperatures of 2340–2370°F (1280–1300°C). Porcelain shows its true qualities with transparent glazes and can develop beautiful densities of color—for example celadon glazes pooling in surface marks can be stunning.

Porcelain samples

The pure white color of porcelain makes it an excellent choice for staining with underglaze colors. Being such a fine, smooth texture, it has little resistance to warping, and is very brittle before firing.

Carved decoration
Margaret Frith's finely thrown ginger jar was carved with a floral decoration when leather-hard using a sharp bamboo tool. The light blue celadon glaze pools in the carved lines, giving darker hues and enhancing the design.

Further Information

Incising and sgraffito, pages 76–77
Celadon glaze recipe, page 163

Paper clay

Of all the clays that have recently been developed, paper clay has to be the most versatile. Quite simply, paper clay has the ability to stick to itself in any state— wet or dry, thick or thin, with additions being attached using paper clay slip as glue. It really is a magnificent material.

Paper clay can be left to stiffen on plaster bats, lifted off when leather-hard or even bone dry, and cut into sheets for assembly. Alternatively, it can be scraped from the bat while still wet and kneaded to form a plastic clay. You can even throw with it. While still a slip, it can be poured or spread into molds and allowed to dry. Using paper clay, you can make large-scale work that is extremely strong and a fraction of the weight of regular clay. The small hollow fibers of cellulose found in paper pulp provide capillaries for wet clay to soak into and adhere firmly. When fired, the paper burns away, leaving a honeycomb of holes through the clay body, thereby reducing its weight.

Making paper clay

1 Mix up a thick slip from powdered clay. Here, water is added to a bucket of porcelain and stirred with a stick. You should wear a mask because adding water to the dry powdered clay may cause dust to rise.

2 Use a metal mixing blade attached to an electric drill to blend the dry powder into the water. The finished consistency should be like thick cream.

Assembling after firing
This garden sculpture, "Vortex," is one of Graham Hay's assembled series. Accustomed to breaking and joining dry and wet paper clay elements, it was a natural progression for Hay to create works that are assembled after firing. The twisting spines were made by rolling plastic paper clay into long coils. After firing, they were placed through holes in the central tube, allowing the viewer the opportunity of rearranging them.

3 Put the dry paper fiber into a bowl and soak it with water. This commercially supplied fiber can give off a fine, dry dust, so make sure you wear a mask until it is all soaked.

4 Mix the water into the pulp until every fiber is saturated. The color will darken—a good indicator of whether it is thoroughly soaked. The quantity of pulp you will need depends on the results you wish to achieve, but usually 30–50 percent pulp can safely be added to the clay slip.

5 Squeeze the water from the paper pulp and add it to the slip. Thoroughly mix the paper fibers into the slip using the mixing blades. The thick slip will become runnier as the water from the fibers is absorbed.

6 Pour the paper clay slip into a plaster bat and use a rib or similar tool to smooth it out into a sheet. If you allow the surface to dry, it will have the quality of handmade paper with deckle edging. Alternately, you could use a rolling pin to smooth it when the paper clay is leather-hard.

Assembling slabs
The framework of this boat sculpture, "Run Aground," by Graham Hay was assembled from dry paper clay "planks," cut from slabs with a sharp knife when leather-hard. Liquid paper clay in a squeeze bottle was used to glue the remaining planks to the framework. The finished sculpture was fired to earthenware temperature.

Further Information

Coiling, pages 42–43
Press molding, pages 52–53

Colored clay

Staining the body clay a different color gives an infinite variety of decorative possibilities. Strong colors can be achieved for creating bold and striking pieces, or you may prefer subtle variations in tone. With the wide availability of commercial colorants, an extensive palette of hues is at your disposal.

White-firing clays are best for producing bright colors. Test the intensity of commercial colorants by mixing sample batches of colored clay using quantities of 5 percent colorant upward. At bisque temperature the colors will appear dull and muted but they will intensify at higher temperatures. If you are using oxides to stain your clay, bear in mind that if you use a large quantity it will act as a flux in the body and lower the maturing temperature of the clay. Calculating the quantity of colorant by weight is always a more accurate method and will give greater control when you need repeat batches of the same color. Mix the stain with powdered clay, as shown below, or add a little water to the stain to make a paste and knead it into plastic clay in the same way that you would add grog (see page 30).

Coloring plastic clay

Color can be mixed into plastic clay by kneading in a paste made from stain or oxide and water.

1 Weigh out four small balls of clay of equal weight. Measure 1 level teaspoon of colored stain, then measure three more quantities, using 2, 3, and 4 level teaspoons of stain. Alternatively, weigh the required amounts. Mix each measure with enough water to form a smooth paste, and knead each portion of colored paste into one ball of clay.

2 Make each ball of clay into several small slabs, and scratch a note of how much color was used into the back of each. These are your test pieces, and when fired, you will have a series of slabs with progressively denser color. You can see what different amounts of stain look like in your clay.

Coloring powdered clay

1 In this example, 10 percent blue body stain is added to powdered white porcelain clay. Mix the two powders together roughly while dry. Make sure you wear a mask because the dust is a hazard.

2 Slowly add some water to the dry powder, stirring to mix the constituents evenly. Add the water gradually or the clay can easily become too runny. A slip trailer has been used here to give greater control over the flow of water being added.

3 Mix the clay and stain thoroughly into a stiff paste. Try not to make the mix too wet or too dry—it should have the consistency of soft, plastic clay. Scoop the clay from the bowl and knead it on a plaster bat until the color is evenly dispersed throughout and the clay is in a workable condition (see page 34).

Further Information

Agateware, pages 90–91
Slip decoration, pages 100–101
Slip trailing, pages 106–107

Raku clay

The raku process involves the rapid firing and cooling of the ware, with the pots being removed red hot from the kiln. Clays subjected to this extreme of expansion and contraction must have a coarse, open texture in order to survive the thermal shocks. High percentages of grog (see page 30) should therefore be wedged into the body. This grog content means that the clay is also resistant to warping, making it ideal for large tiles, slab pottery, and large-scale sculptural work. Commercial suppliers produce many different clays specially formulated for this type of work, although you can make your own. The addition of talc to the body will help it to withstand thermal shock during raku and sawdust firing.

Added grog
This thickly thrown bottle by Martin Everson-Davis is made from a clay body with a high percentage of molochite—a white china clay grog—giving good resistance to thermal shock. The alkaline-based frit glaze produced good open crazing while cooling, enhanced by the smoking of post-firing reduction.

Life-flame firing

The interaction of fire on the ceramic surface is of prime importance in this piece by Steve Mattison, titled "Adam and Eve," which was fired in a live-flame kiln. The figures were raku fired with a copper matte glaze to give earthy colors reminiscent of archeological finds.

Textured surface
The richly colored and textured surface in this piece by Harvey Sadow was achieved by a combination of techniques: the application of colored slips, sandblasting the surface, and multiple raku firings.

Sawdust method
A fuming mixture was applied to this piece by Mervyn Nichol, and after raku firing, it was withdrawn from the kiln and buried in sawdust.

FURTHER INFORMATION

Slip decoration, pages 100–101

Clay additives

Many potters experiment with additives to improve the working properties of the clay or to enhance its surface textures or finishes. The most common additive is clay itself, which can be added in the form of grog. This is fired clay that has been ground down into various grades. It is mixed into plastic clay to improve its strength and increase its resistance to warping. Grogs range from fine powder to coarse grit, giving the clay a granular appearance. Red clay grog will produce spots and bursts of iron through the glazes, speckling the surface of stoneware pottery, especially if reduction fired. White grogs are available in the form of molochite, a calcined form of china clay that is a popular addition to white stoneware clays and porcelains because it does not affect the color.

Adding grog

1 Weigh the quantity of grog required and place it in a bowl. A usual mix would be 2–3 lb (1–1.5 kg) of grog to 55 lb (25 kg) of plastic clay. Dampen the grog to prevent its porosity from drying out the clay.

2 Use a wire to cut the lump of clay into slabs. Place handfuls of damp grog between the slabs, stacking the slabs one on top of another. Press down the clay and knead the grog thoroughly into the plastic clay in the normal way (see page 34).

3 Use a wire to cut the lump in half and run your finger across the cut surface to check that the grog is evenly dispersed throughout the body.

Various additives

Dry porcelain

(**1**) Crushed into chunks this gives a heavy texture to clay and produces softened lumps when fired.

Feldspar
(2) Kneaded into stoneware clay, feldspar produces beautiful soft eruptions in the surface.

Grit and aggregate
(3) These additives give a heavy texture for making sculpture. Some particles will melt while others will remain rough-edged chunks.

Grog
(**4**) This increases the strength of the clay body and gives additional texture.

Coarse molochite
(5) Coarse molochite is available in large particles for bold sculpture work.

Fine molochite
(6) A good substitute for grog where retaining the whiteness of the clay is essential.

Natural materials

To form interesting surface textures, combustible materials that will burn away during firing can be introduced into the clay, or they can be pressed into the surface while the clay is still pliable.

Reclaiming clay

All pottery processes create a certain amount of waste clay—the trimmings and scraps in the splash tray of the wheel, small coils that have become too stiff to be workable, or the off-cuts from leather-hard slabs that have been put aside and allowed to dry out. Until it is fired, however, all clay can be reclaimed to a working condition. Contrary to expectations, clay improves with age, and if left in a soft condition, increases its plasticity.

Dry or leather-hard clay, grated or crushed, can also be used for making slip, but bear in mind that if you are using slip for joining pieces rather than for decoration, it must be made from the same clay as the original work.

Reclaiming clay

1 Pour clean water into the bucket of dried clay so that it is completely covered. Over a period of a few days the clay will disintegrate into particles and become a sludge, settling in the bucket. Scoop off any excess water by pushing a jug down into the sludge and allowing the water to flow in. Repeat this until only a small amount of water remains on the surface.

2 Lay out the softened clay on a plaster bat as evenly as possible so that it dries out equally. Turn the clay mass over regularly to ensure that it stiffens from both top and bottom.

3 When the clay has stiffened, peel it off the bat and wedge it thoroughly, wiring through the block many times. Work the clay softer than you would normally use so that it will not dry out too quickly and need reclaiming over again.

Making slip

1 Use leather-hard clay by grating it into small particles with a kitchen-grater or woodworking surform.

2 Dry clay can be crushed easily with a rolling pin or in a pestle and mortar. When using a rolling pin, place the dry pieces in a bag to keep the clay contained.

3 Mix the clay gratings or powder with water to form a slip. Hot water or a few drops of vinegar will help to break the clay down to a smooth consistency.

Keeping clay moist

Provided you use the clay quickly, you can keep it moist in its plastic bag, making sure that you seal it tightly after each opening. If you need to keep your clay for longer, pack the wrapped clay in a closed bin or in strong polythene sheeting. Store it slightly wetter than working consistency if possible to allow for drying during storage and preparation for use.

If your storage space is warm, you may need to dampen the clay before use. Cut it into slices, and layer these in a bowl. Cover with water and let the clay soak until it has softened. Remove excess water by placing or kneading it on a plaster bat.

FURTHER INFORMATION

Preparing clay, pages 34–35
Slip decoration, pages 100–101

Preparing clay

It is important to prepare clay well before use, as the process of wedging and kneading removes any air bubbles and gives the clay an even consistency rather than being dry on the outside and wet on the inside. This is especially important if you are making your own clay, but even clay bought in a plastic state from commercial suppliers will require a little preparation before use, as it soon loses its even consistency. Clay that is stored outside in plastic bags for any length of time in cold weather may be in need of kneading and wedging, as frost will have frozen the water content and broken down the structure of the clay. Wedging and kneading are done when the clay is soft but has passed the sticky stage. Use an absorbent surface such as a wooden workbench or plaster slab that will absorb some of the water, though if you use plaster, ensure that it is in good condition, or pieces could be taken up into the clay.

Kneading

1 Gather the clay into a compact mass and press down onto it with the palms of your hands, pushing it away from you at the same time, then raise it from its back and repeat the sequence in a smooth rocking motion. As the developing roll of clay lengthens it can be given a quarter turn and repeated. An alternative method of kneading is to apply downward pressure with one hand while lifting the mass from the work surface with the other in a rhythmic, flowing action, resulting in a spiral pattern.

2 The kneading process should be carried out several times to ensure that the whole clay mass is thoroughly mixed.

Wedging large pieces

1 Large pieces of clay should be wedged on the surface of a sturdy bench or slab positioned at waist height. It is important that the surface is porous so that the clay does not stick. Begin by cutting the clay block in half with a wire.

2 Lift up one half and slam it down onto the other one from a comfortable height. The larger the amount of clay, the less force is required.

3 The process of repeatedly cutting and slamming the block of clay serves to mix it and remove any air.

4 Looking at a sliced section of the wedged clay will quickly reveal whether it has been sufficiently mixed and is air-free. Wedging is a preparation process normally used in conjunction with that of kneading.

Further Information

Reclaiming clay, page 32
Making slip, page 33
Keeping clay moist, page 33

CHAPTER 2

FORMING METHODS

Most of us perhaps associate pottery with throwing on the wheel, but there are many other ways of making clay objects, from simple pinching methods to coiling, slabbing and press-molding. For those new to pottery, hand-building techniques offer an excellent introduction to the craft, while those who wish to make wheel-thrown pots will find some valuable advice to help them master the skills.

Pinching

This is one of the simplest of hand-forming pottery techniques, and provides a valuable introduction to working with clay. Any clay is suitable provided it is soft and pliable but not sticky. For first attempts, you may find it helpful to use grogged clay (see page 30), which will hold a shape well without cracking. A variety of subtly different pinched shapes can be produced which vary from tall thin shapes to shallow open forms, each produced by gently rotating the ball of clay in one hand while the thumb and fingers of the other hand thin and shape the walls. The wall should develop with an even thickness, and a foot can be formed either by rolling the base along an edge to define it or by adding on a thin strip of clay to form a small cylinder for the pinched form to stand on. Small spheres can be produced by joining two similar sized small bowls together rim to rim.

Pinching a bowl shape

1 To begin a pinch pot, hold a small ball of soft clay in one hand and insert the thumb of your other hand into the middle. Push your thumb down to about 3/16 inch (5 mm) from the bottom and start to gently squeeze the clay between thumb and fingers, slowly rotating the clay ball.

2 As the wall thins, move your fingers up toward the rim. Pinching should be done slowly so that the form evolves gradually with an even thickness throughout the clay wall. The rim can be thinned and allowed to flare outward as a natural progression of the shape. Undulating rims are well suited to delicately pinched forms.

3 A base can be attached to the basic pinched shape. Here a thin strip of clay, rolled out and cut to size, has been attached with slip, and the two pieces are now welded together with a modeling tool to ensure a good joint.

Making a narrow pot

1 A narrow pinched shape can be made by first pulling the clay up over your thumb and then pinching the shape between thumb and fingers while the clay is slowly rotated.

2 Shapes that widen too much can be narrowed by making folds in the wall and welding them together with your thumb and fingers. The increased thickness of clay can then be pinched upward to increase the height.

3 Take care with the top section and rim, as careful thinning can be a delicate operation. The base can be teased out to form a slender stem, but this must be stable enough to support the completed form. It is sometimes necessary to sit the form in a container to support it until the clay has stiffened sufficiently to take the weight. Further refinement of the shape can be made by cutting and scraping at the leather-hard stage.

Further Information

Clay additives, pages 30–31
Lidded pinch pot, pages 40–41

Lidded pinch pot

This project, which is to be sawdust fired (see page 180), is specially designed for anyone who is itching to make pots but does not have access to a kiln. If you do have a high-temperature kiln, or access to one, it is advisable to bisque fire the pots to 1830°F (1000°C) prior to sawdust firing as this will minimize breakage during the firing and make the finished piece more durable—though still unsuitable for food or liquid use.

YOU WILL NEED:

- 1 lb (450 g) soft, well-prepared, heavily grogged clay
- 4 tablespoons water
- Metal spoon

A heavily grogged “raku” type of clay (see page 28) has been selected for its ability to withstand more thermal shock than smoother clays. If you have a smooth clay, you can add up to 10 percent fine silica sand or grog. The gritty nature of the clay will also make it dry more quickly, so you may need to keep your hands damp while working, though avoid making the clay wet and thus sticky. If, however, the pot is soft and sagging, leave it upside-down to dry a little.

1 Begin with a ball of prepared clay that is soft but not sticky. Holding it in one hand, press your thumb into the center to begin hollowing it out (pinch pots are sometimes called “thumb pots”). Beware of using too much pressure, as this would result in a thin spot or even a hole in the wall of the pot.

2 Rotate the pot in one hand while you gently pinch the clay wall to approximately 3/16 inch (5 mm) thick. Work from the base of the pot upward, ensuring that the walls do not vary in thickness, but are smooth and uniform. Leave a thick rim on top, as this will prevent the rim from drying too quickly and then cracking.

3 Pinch the opening of the pot outward to make a larger aperture, or squeeze inward, as shown here, to make the opening smaller. Without making the top rim too thin, pinch up to form the gallery which the lid will fit over.

4 To make the lid, take a smaller ball of soft clay and follow steps 1 through 3 with a more gentle touch. When the lid is a little drier than leather-hard rub the back of a spoon on the surface to burnish it (see page 88).

5 When the pot is finished, allow it to dry completely before firing. The amount of drying time will depend on the temperature and humidity. One test of dryness is to hold the pot to your cheek; if it feels cool it is not yet dry.

The finished pot
The pot was sawdust fired in a small bucket, producing the characteristic black carbonized surface. No water was used to clean it because the temperature was not high enough to ensure it would not return to soft clay if immersed in water, especially as it was not bisque fired first.

Further Information

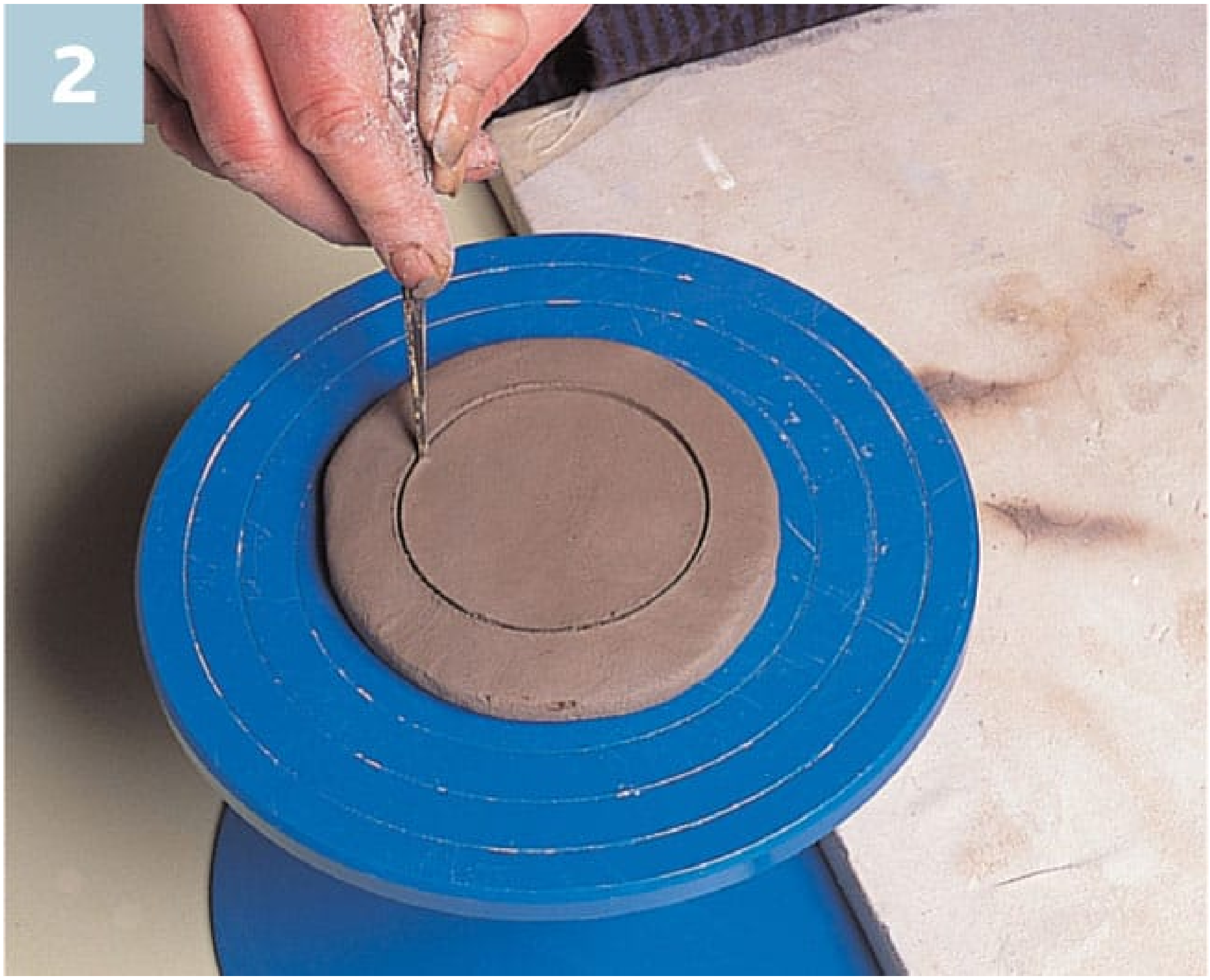
Pinching, pages 38–39
Firing schedules, pages 174–175
Smoke firing, pages 180–181

Coiling

This hand-building technique involves making forms from coils, or ropes, of clay. The coils can be rolled by hand one at a time as you use then, or you can make several at once, wrapping them in plastic to keep them damp until you need them. For speed, some potters extrude coils using a machine with a shaped die plate at one end; different die plates can be used to produce different coil profiles. Clay used for coiling should be fairly plastic to prevent it from cracking as you work. It should also have 20–30 percent grog or sand content to increase its strength (see page 30). A turntable or banding wheel (see page 11) is helpful but not essential.

The coils should be slightly larger in diameter than the required thickness of the wall of the pot, because they will be thinned slightly when joined together. Visualize the shape before you begin: if it is to taper inward, each successive coil must be smaller in diameter; they should be larger if the shape is to grow outward. The joints between coils must be firmly sealed on the inside to prevent horizontal cracks from appearing but can be left visible on the outside to give a decorative finish. The pot will need to be left to stiffen occasionally as it grows so that it does not collapse under the weight of the added clay—you can use a gas torch or hair dryer to speed the process. If the top coil dries too much, score and slip the end so that the next coil will adhere.

1 Use the palms of your hands to roll out even coils of clay on an absorbent surface such as a canvas-covered table. Move your hands gently outward, stretching and lengthening each coil as you roll. Rotate the coils several times to keep them round; short, forward movements will make the coils oval in section.



2 For the base of the piece, flatten out a pad of clay with the palm of your hand or a rolling pin. Place the base on a turntable or banding wheel and cut a circle of the required diameter. You can use a circular object as a template if you wish.

3 Place the first coil on top of the base, wrapping it around the circular shape. If the clay is soft enough, the coil will adhere without water. Some coil builders only apply one coil circle at a time, but here the whole length of the coils is used.

4 Firmly join the coil circles together on the inside of the pot by smoothing them in a vertical direction using your fingers or a wooden tool, supporting the outside of the pot with your other hand. Repeat this process on the outside if you want a smooth outer surface.

5 When you have secured the first few rows, continue in the same way until the pot is the desired height, taking care to position the joints at the end of coils in a different place on each row to prevent any vertical weaknesses from developing.

6 Use a metal scraper or rubber rib to refine the shape of the pot and produce a smooth surface for decoration (unless you want the coils to show). Even if you intend to decorate using texture, starting from a smooth surface will enhance your mark making.

Further Information

Preparing clay, pages 34–5
Adding grog, page 30

Coiled fruit bowl

In this project the shape is begun with a pinch pot (see page 38), to which coils are added. The oval is an introduction to the endless possibilities of non-circular forms that can be made by the coiling process. Coiling is also one of the best methods for making non-symmetrical shapes.

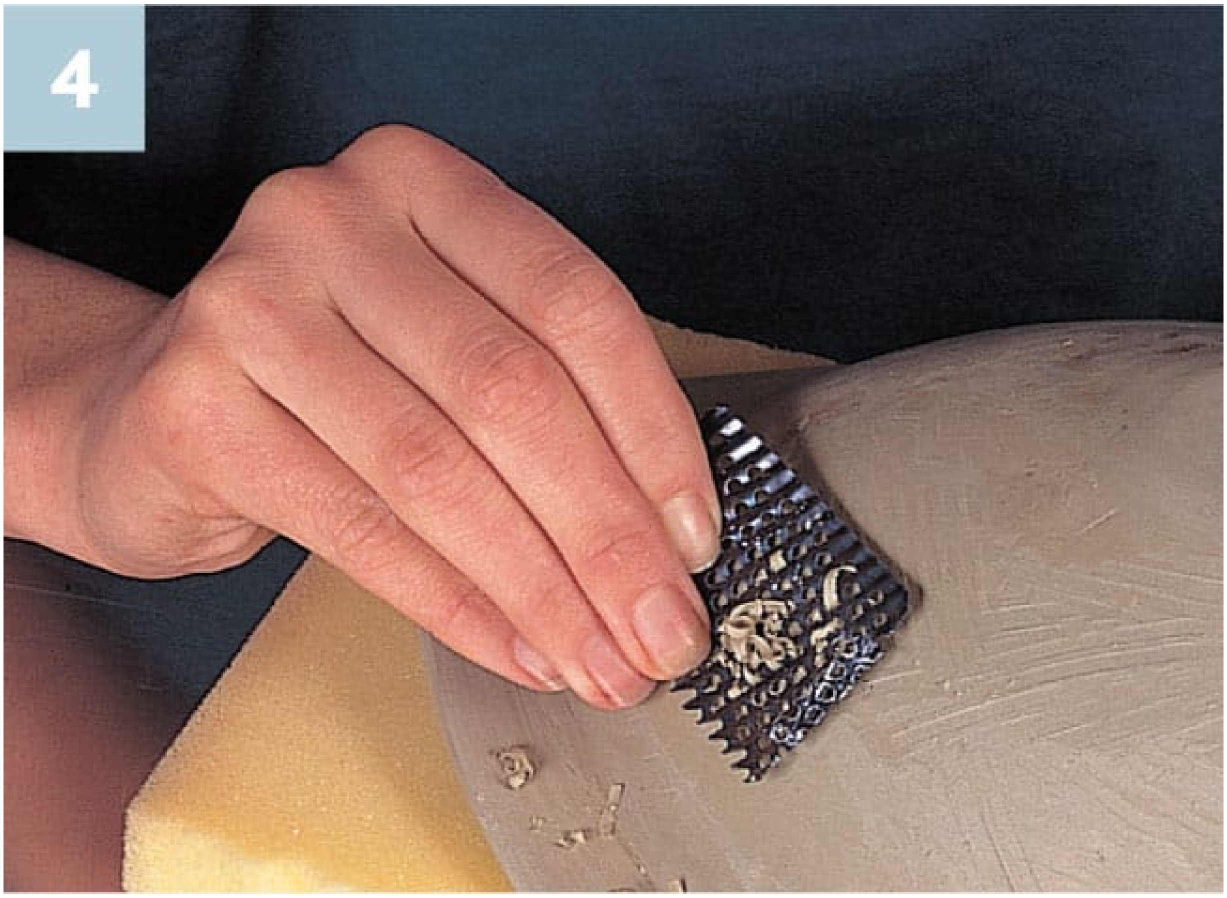
YOU WILL NEED:

- 6 lbs (2.7 kg) white stoneware clay
- Water
- Needle
- Brushes
- Rubber and metal scrapers
- Surform blade (optional)
- Home-made cut plastic template for shaping stem foot rim
- Banding wheel (optional)
- Board
- Flat surface for rolling coils
- Water spray bottle (optional)

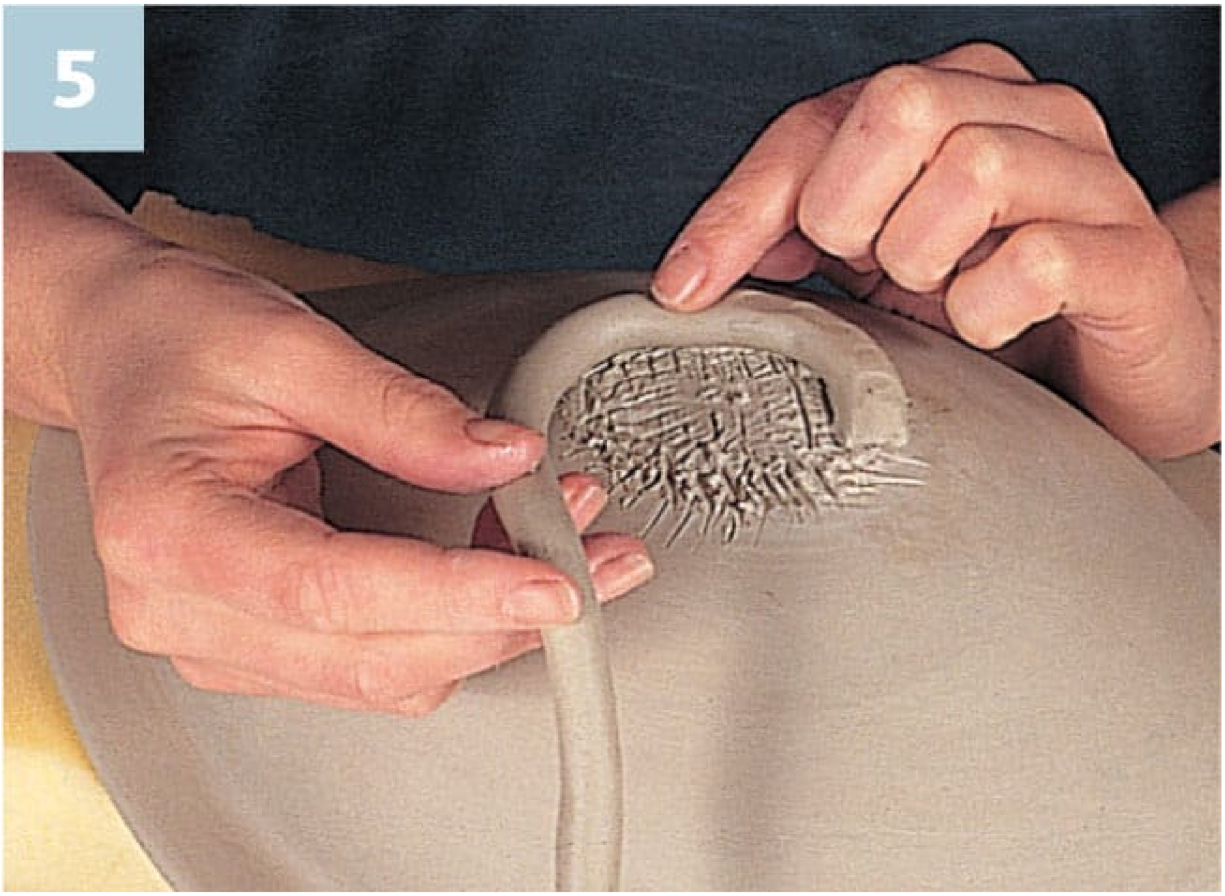
1 Make a thick pinch pot with walls 3/8 inch (1 cm) thick and dry it to leather-hard, keeping the rim soft with plastic wrap. Apply coil lengths to the scored and wet rim of the pinch pot and securely join as shown on page 42. Do not allow the base to dry beyond the leather-hard stage; it can be wrapped in plastic to prevent over-drying.

2 Push the wall together to form an oval shape with an undulating rim, then build up with coils until the walls are too soft and floppy for further layers. Leave the pot to dry upside-down on plastic with its rim covered to stay soft. If preferred the undulating rim can be leveled by adding coils to the lower dips, but in this case the shape is to be retained.

3 When the wall of the pot is again leather-hard, score and wet the top end before adding the next coil layer. Apply the coils to the outer edge of the rim to make a wide flattened rim to finish the top of the shape. Use a rubber scraper to smooth down the shape inside the bowl.



4 Leave the pot to dry to leather-hard, then turn it upside down onto a support of foam or crumpled paper. Scrape down any bumps on the surface with a Surform blade (normally used for shaving wood, but also good for leather-hard clay) or metal scraper, which can be toothed or smooth edged.



5 Decide where to place the stem foot. A banding wheel or throwing wheel will help you to place the foot ring centrally, but otherwise use a ruler to mark out the center. Use a needle to score a crosshatch pattern, wet it and put on a soft coil of clay. Continue applying and joining coils until the stem foot is the right size.

6 Smooth the surface and use a home-made plastic template to incise a line around the rim to define the edge. Dry the stem foot to leather-hard. The pot is now ready to be decorated.

The finished bowl
After bisque firing, the bowl was decorated with underglaze colors built up in layers, and was then bisque fired again to "fire in" the colors and prevent them from smudging. Thick layers of glaze were rubbed down where necessary, and the bowl was then fired to 2084°F (1140°C). This is a relatively low temperature for stoneware, but ensures that the colors do not burn out in the firing.

Further Information

Stoneware, pages 20–21
Pinching, pages 38–39
Underglaze colors, pages 118–119

Slabbing

Slab building allows the clay artist to construct both angular, sharp pieces and softer, organic forms, depending on the stiffness of the clay when assembling. Forms can be designed and constructed from pieces of thin cardboard, which can then be dismantled and used as templates for cutting out the required shapes from the clay. You can then build up the clay shapes into the required design. Using wooden templates will allow you to make numerous identical pieces. Softer work may need support during building—crumpled newspaper can be placed inside, temporary or permanent clay stretchers can be inserted, or wooden supports can be used until the clay stiffens sufficiently to be self-supporting. Pieces of clay can be squeezed into different shapes and used to support projections until they are dry enough to stay in position.

The first thing you need to do is flatten and roll out the clay into slabs of the appropriate width, length, and thickness. This can be done roughly by hand, using pushing, beating, or throwing actions, and then the flattened pieces can be rolled smooth using a rolling pin; smaller pieces of clay can usually be rolled out straight away. Alternately, cut slabs from a block of clay using a wire.

Pushing out
A quick way of producing basic slabs is to push out the ball of clay with the heel of your hand. The surface of the slabs can then be smoothed using a rolling pin. A clean, canvas-covered table makes a good absorbent work surface.

Beating
Beat large lumps of clay flat with the side of your fist, a wooden mallet, or a smooth piece of wood. Smooth the flattened surface with a rolling pin.

Throwing
For large slabs, "throw" the clay outward while gripping the edge nearest you, and slap it down onto the absorbent surface. Repeat this process until the required size is reached, then smooth the surface with a rolling pin.

Rolling out
Use a rolling pin to roll out lumps of clay between two wooden guides of the same thickness to produce even slabs. Begin in the center, rolling both toward and away from you. Lift the slab from the table and turn it 90° after every roll. Do not force the clay or you will weaken it.

Cutting
Cut the slabs using an adjustable wire harp. Use firm pressure to keep both sides of the harp evenly on the table surface to prevent the wire from rising as it cuts through the clay.

Further Information

Preparing clay, pages 34–35
Slabbing with molds, pages 48–49
Slabbed cheese dish, pages 50–51

Slabbing with molds

One of the obvious uses of the slabbing method is for tile making, but slabs can be joined to form boxes, and cylindrical shapes can also be made. In the latter case, simple molds or formers must be used, as the clay slabs cannot support themselves when soft and pliable. For a simple cylinder, you could use a rolling pin or strong piece of plastic tubing, which should first be wrapped in newspaper to enable easy removal.

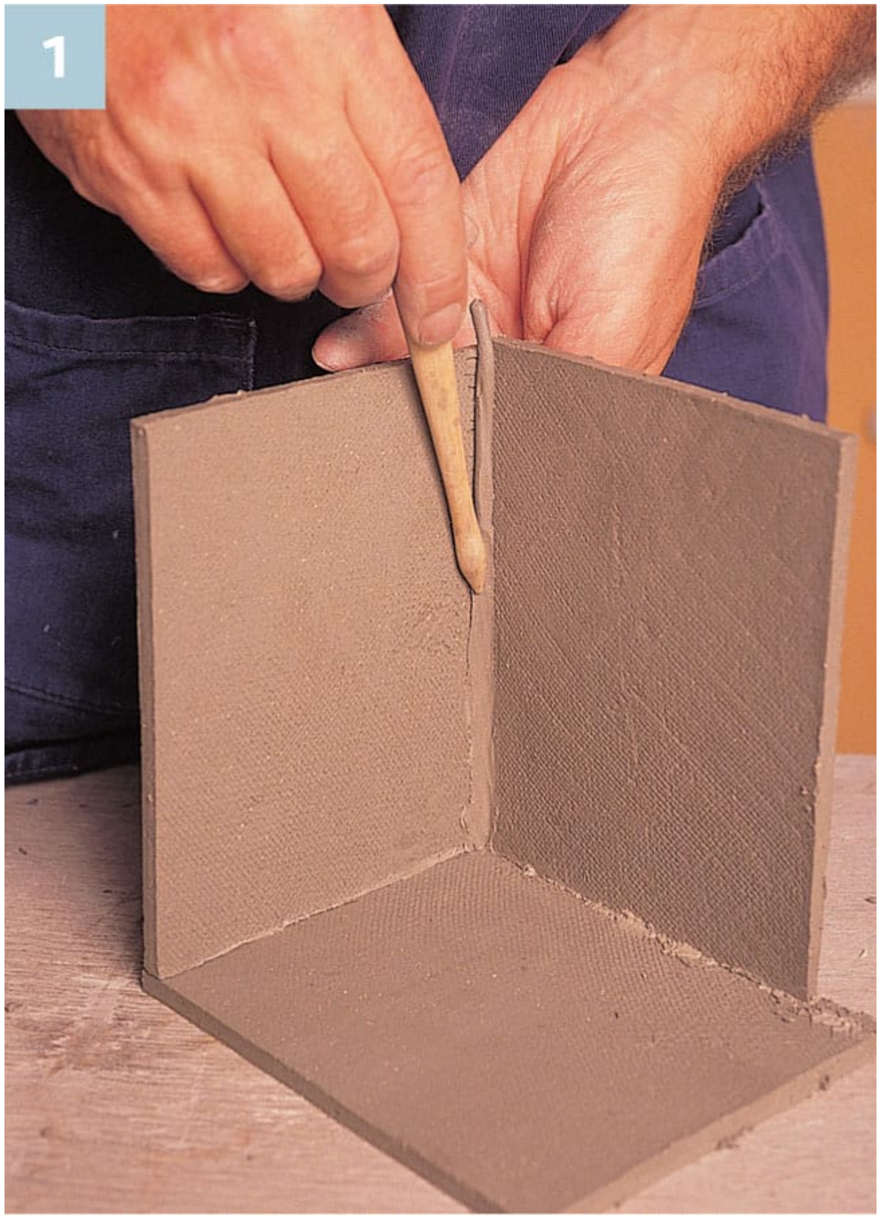
Making a cylinder

1 To make a slabbed or wrapped cylinder, begin by cutting off the ragged edges at the top and bottom of the clay sheet. Wrap newspaper around a section of tubing and form the clay sheet around it. The fabric on which the clay was rolled can be used to assist you.

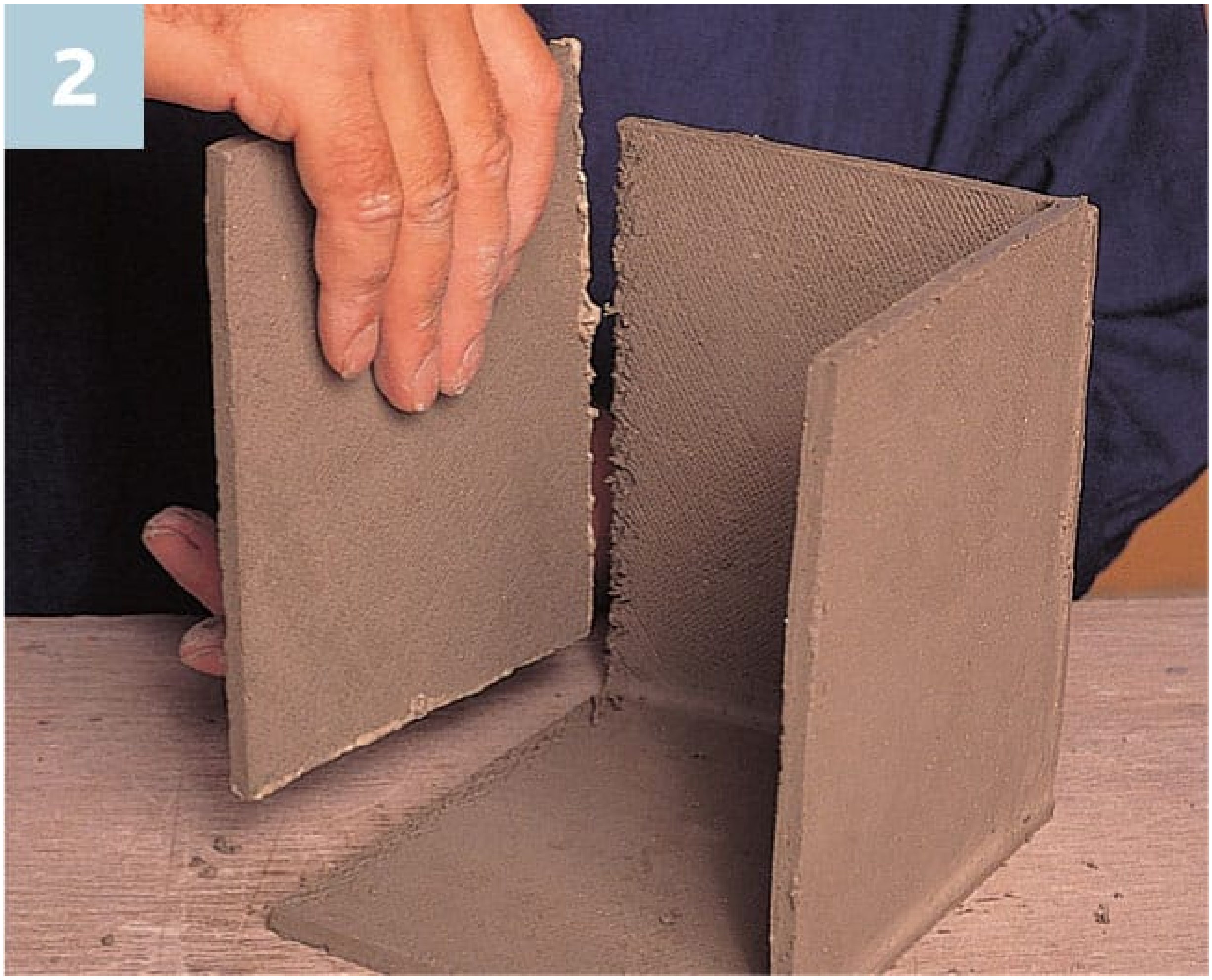
2 Overlap the excess length of clay, and then cut through both layers at an angle of 45°. Remove both off-cuts. Score both edges, apply stiff slurry to the scored areas, and slot the two edges together to form a tight seal.

3 A base can be added by scoring and slurrying the edge of the cylinder base and the proposed clay base. The section of tubing can remain in place until the clay begins to dry out; shrinkage will trap the mold, making it impossible to remove.

Making a box shape



1 Leather-hard sections can be joined together to create slabbed work, in which case each side must be carefully scored and slurried first. Work on top of the base where feasible, and reinforce each joint with a thin, soft coil welded into successive joints.



2 Using clay when it is in its barely flexible leather-hard state produces a crispness and formality of shape characteristic of many slabbed forms. It is advisable to use a coarse, open-bodied clay for this type of work, due to the pressures placed on the joints during drying and firing.

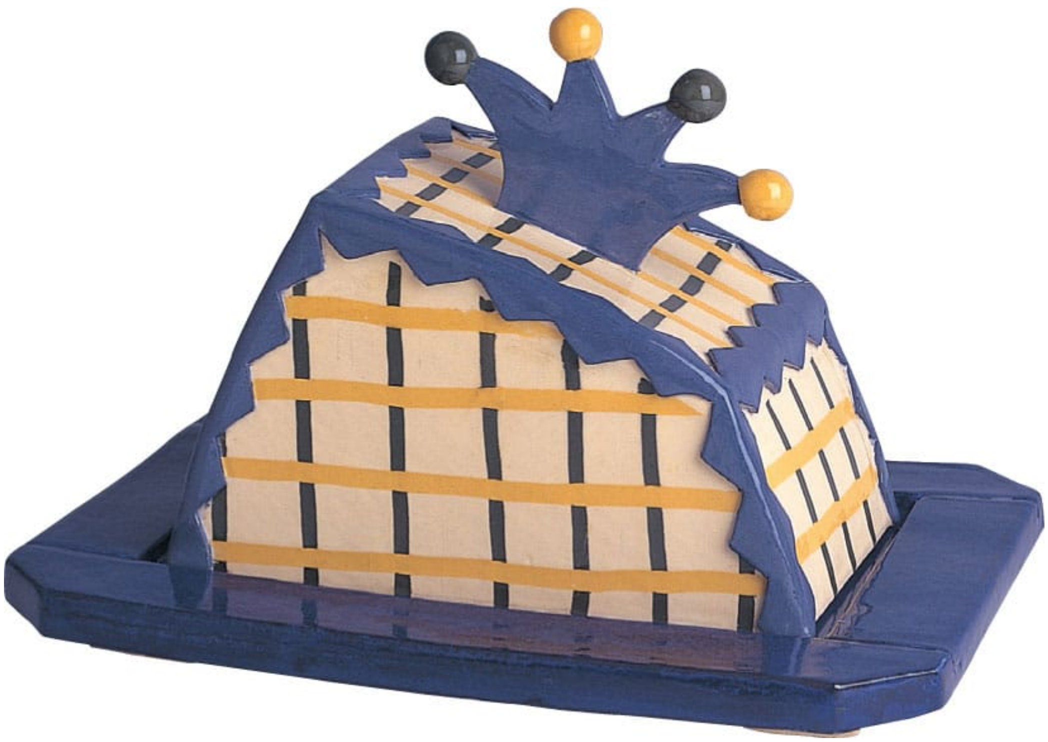
3 Once all the sides are joined, outer joints can be smoothed down with a suitable tool. They should also be carefully welded together on the outer surface to reduce the risk of splitting.

Further Information

Slabbing, pages 46–47
Slabbed cheese dish, pages 50–51
Press molding, pages 52–53

Slabbed cheese dish

This project shows the use of colored clay (see page 26) inlaid into the slab before the shape is assembled. The clay pattern can be symmetrical or loose and free. If you wish to keep the pattern straight, take care to lightly press the rolling pin over it when rolling the pattern into the slab surface, otherwise it may stretch and distort. With non-rigid patterns this distortion can be used to advantage, as it can greatly enhance the unique effect.

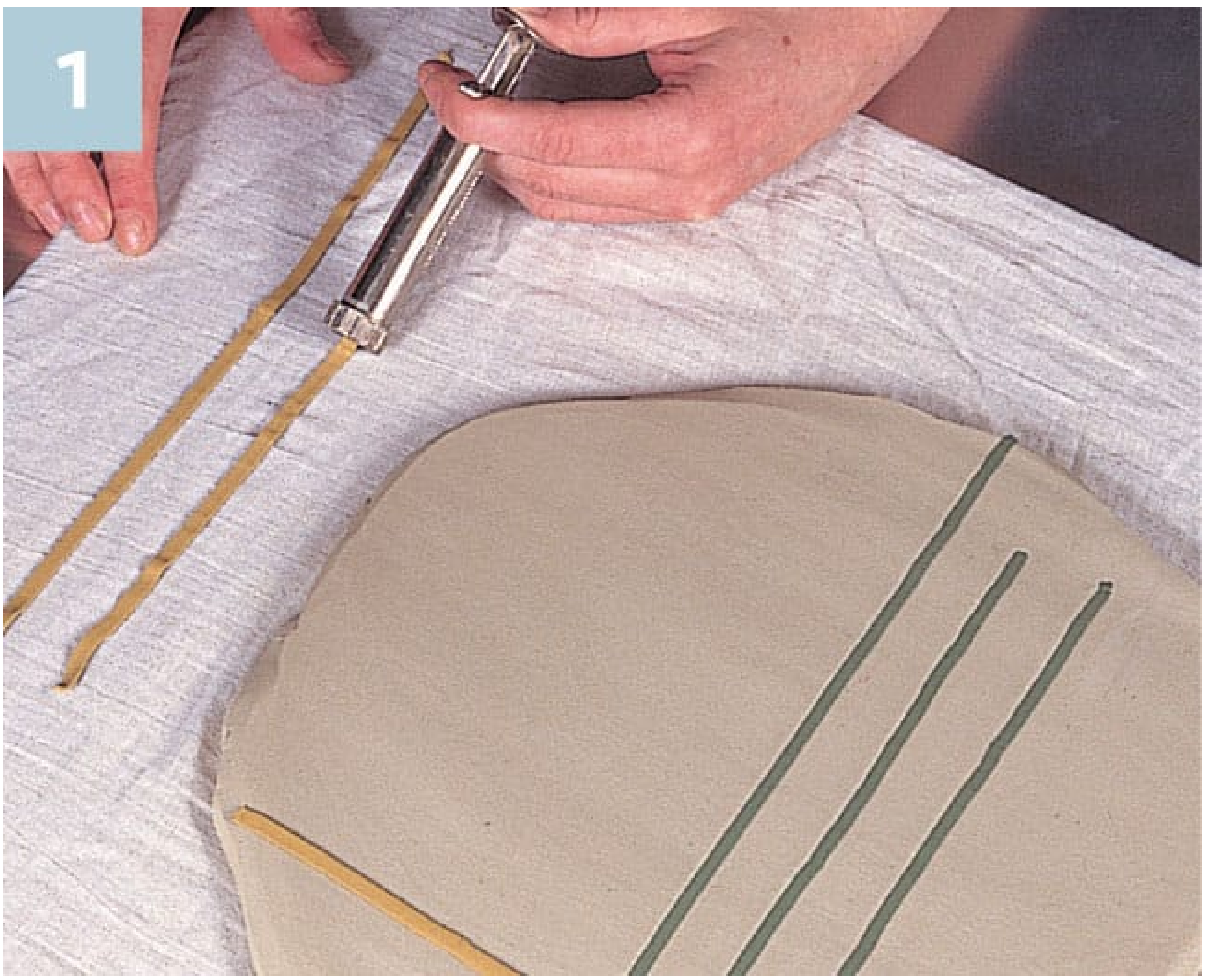


For all domestic ware intended for food use, it is important to ensure that all surfaces in contact with the food are smooth and easily cleaned. So spend extra time finishing the inside edges of the base plate and inside the top of the cheese dish, and choose a glaze that will not craze for these surfaces.

YOU WILL NEED:

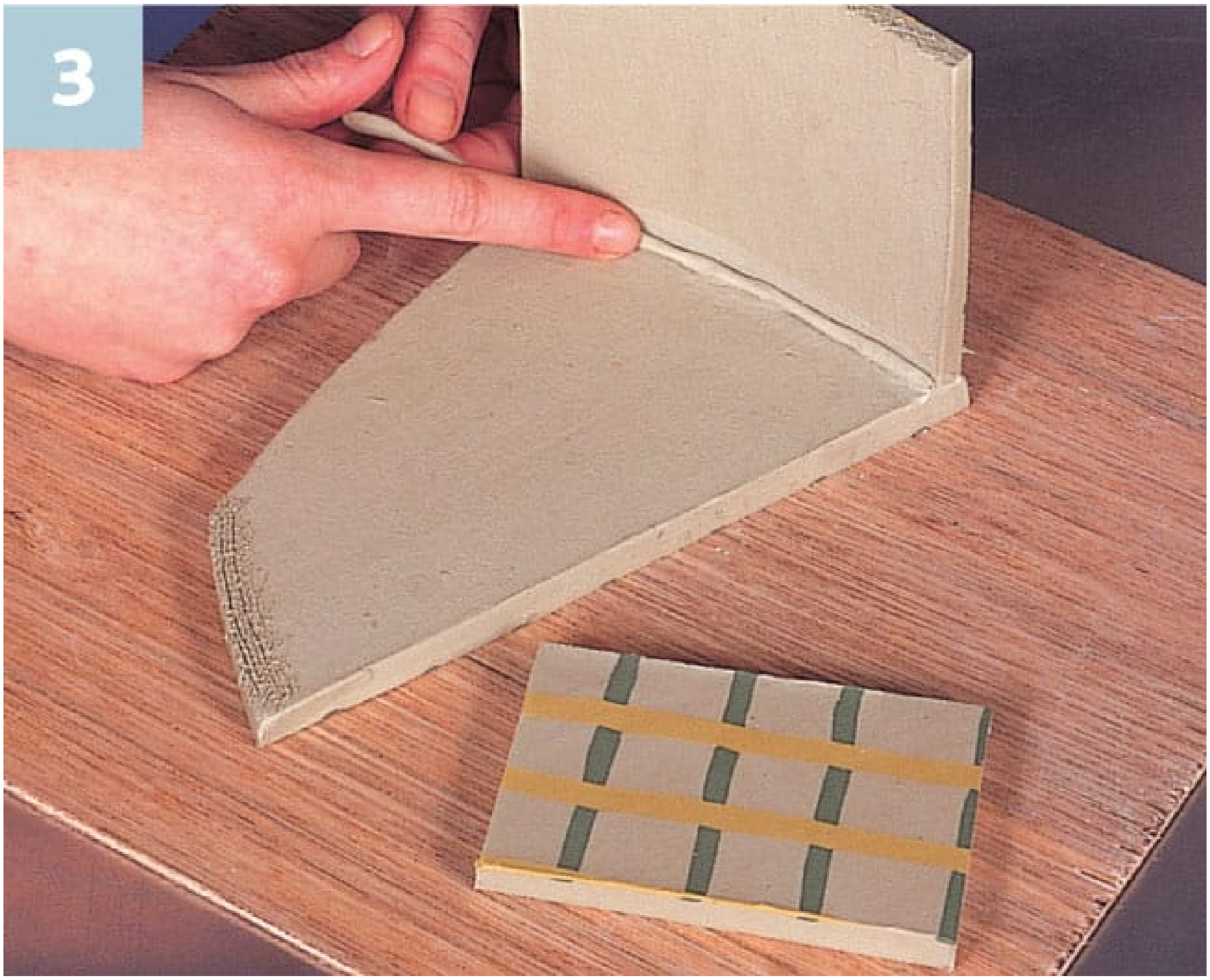
- 15 lb (6.75 kg) well-prepared white stoneware clay
- 1/2 lb (225 g) each of blue, green and yellow colored clay
- Cotton cloth for slab rolling (optional)

- Paper for templates
- Water or slip to join
- Pencil
- Scissors
- Ruler
- Rolling pin
- Potter's knife
- Needle
- Brush

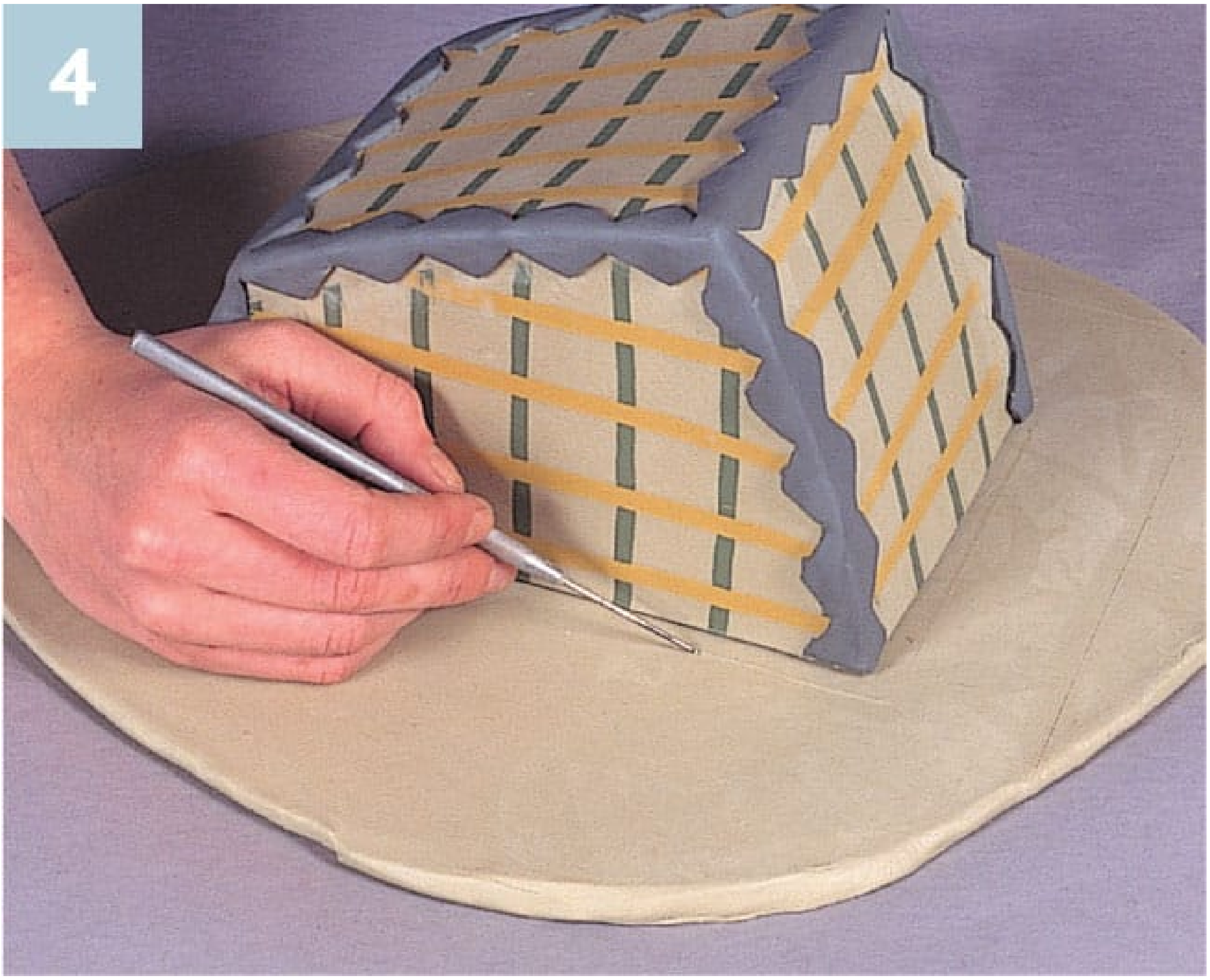


1 Make thin strips of colored clay, either with a hand-held extruder or by rolling thin slabs. Place these on a large slab and use a rolling pin to flatten them into the surface. Let the slab dry until slightly softer than leather-hard.

2 Place paper templates for the walls on the slab, lining them up with the surface pattern, then cut around them. The crest shape for the handle is cut from solid blue clay.

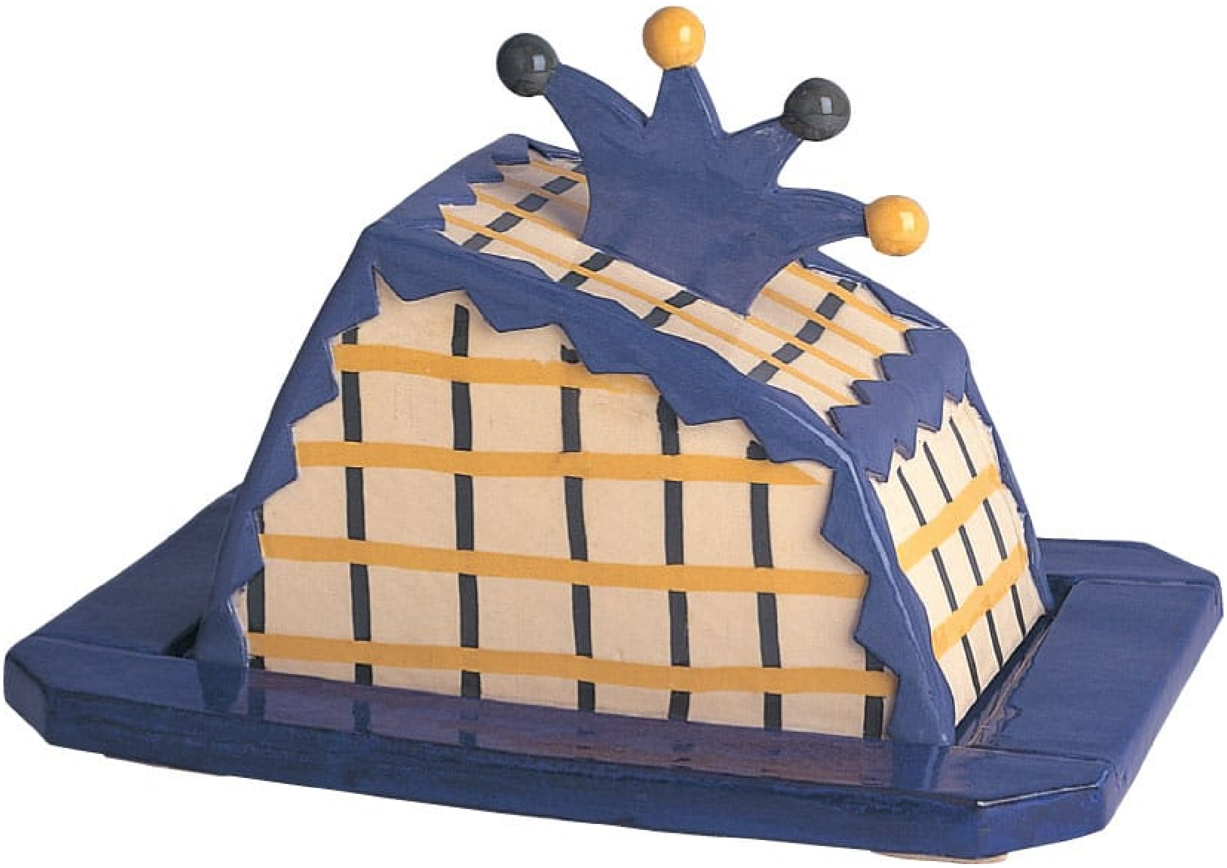


3 Make strong joins when assembling the walls by scoring a crosshatch pattern on the edges and applying water or slip before pressing the slabs together firmly. Reinforce the insides of the joints by smoothing in a thin, soft coil of clay.



4 When all of the walls are joined, cut strips of thin blue clay, score and wet them and join securely on the edges for a decorative border. This will also mask any edges if the colored clay pattern was smudged during assembly. Place the dish top on a leather-hard slab and mark out the shape for the base plate.

5 Score and wet the rim and join on strips of slabbed clay to make a thick, wide rim around the plate for the dish to fit into. To ensure a good fit, leave a 3/16 inch (5 mm) gap all around between the dish top and the plate. Turn the plate over on a flat board, and join on four square slabs in the corners as feet.



The finished dish
After adding the handle and bisque firing to 2012°F (1100°C), the top of the cheese dish was dipped into transparent glaze. The base plate was dipped into a blue glaze.

Further Information

Colored clay, pages 26–27
Inlaying, pages 80–81
Agateware, pages 90–91

Press molding

Wrapping clay around a former, shown on page 48, is one way of using molds, but you can also press clay into or over the surface of a mold to produce convex or concave forms. Molds are most commonly used either when potters wish to make a large quantity of identical objects or when they wish to produce shapes or surfaces that are hard to achieve by hand-forming methods.

Molds can be improvised from ordinary dishes covered in cling wrap to prevent sticking, and you can also use bisque-fired pots, which are porous and release the clay readily. But for any complex surface you will need to make plaster molds. This does carry dangers, as any small pieces of plaster mixed in with the clay can cause explosions when firing, so it is wise to make molds away from the potting studio, and never to try to reclaim clay after press molding. The usual method is to make a clay model of the shape to be molded, build a wall around it, and pour the plaster on top. It is important that there are no undercuts on the model, as this will make it impossible to remove the plaster mold from it. You may also need to coat the mold with a thin layer of a releasing agent to prevent the clay sticking to the plaster.

Making a plaster mold

1 Here found objects are pressed into the clay model. Fill any undercuts or areas of the objects, then push the object onto a flat slab of clay so that the surface to be molded is facing upward, and coat it with a releasing agent.

2 Build a wall around the object using clay, cardboard, plastic, or wood. You can tie string around the walls to make them more secure. Press thick coils of clay around the outside to brace them further. Mix enough plaster to cover the object and pour it into the space. Remove the walls, clay coils, and objects when the plaster has set to reveal your mold.

Pressing a single slab

1 If the mold is shallow, a single slab of clay can be pressed into it. Roll out a large slab of clay on a piece of soft, clean cloth—using the cloth to support the slab—then place it onto the mold.

2 Remove the cloth and gently ease the slab of clay right into the mold. You can use a dampened sponge and rubber rib to finalize the shaping and smoothing of the inside surface. Remove the excess clay from the rim of the mold using a wooden potter's knife; then remove the pot as described in step 2 for multiple slabs (below).

Pressing multiple slabs

1 If you are using a large or deep mold, you may need to use smaller slabs of clay. Join the overlapping edges securely with pressure from your thumb. Keep adding slabs of clay until the mold is filled.

2 As the plaster absorbs the moisture from the clay, the bowl will slowly stiffen and shrink. You will see an even gap appear between the clay and the mold when it is ready to be removed. Tilt the model to help push the pot out, taking care to support the bowl while you do so.

Further Information

Slabbing with molds, pages 48–49
Mixing plaster for molds, pages 54–55

Mixing plaster for molds

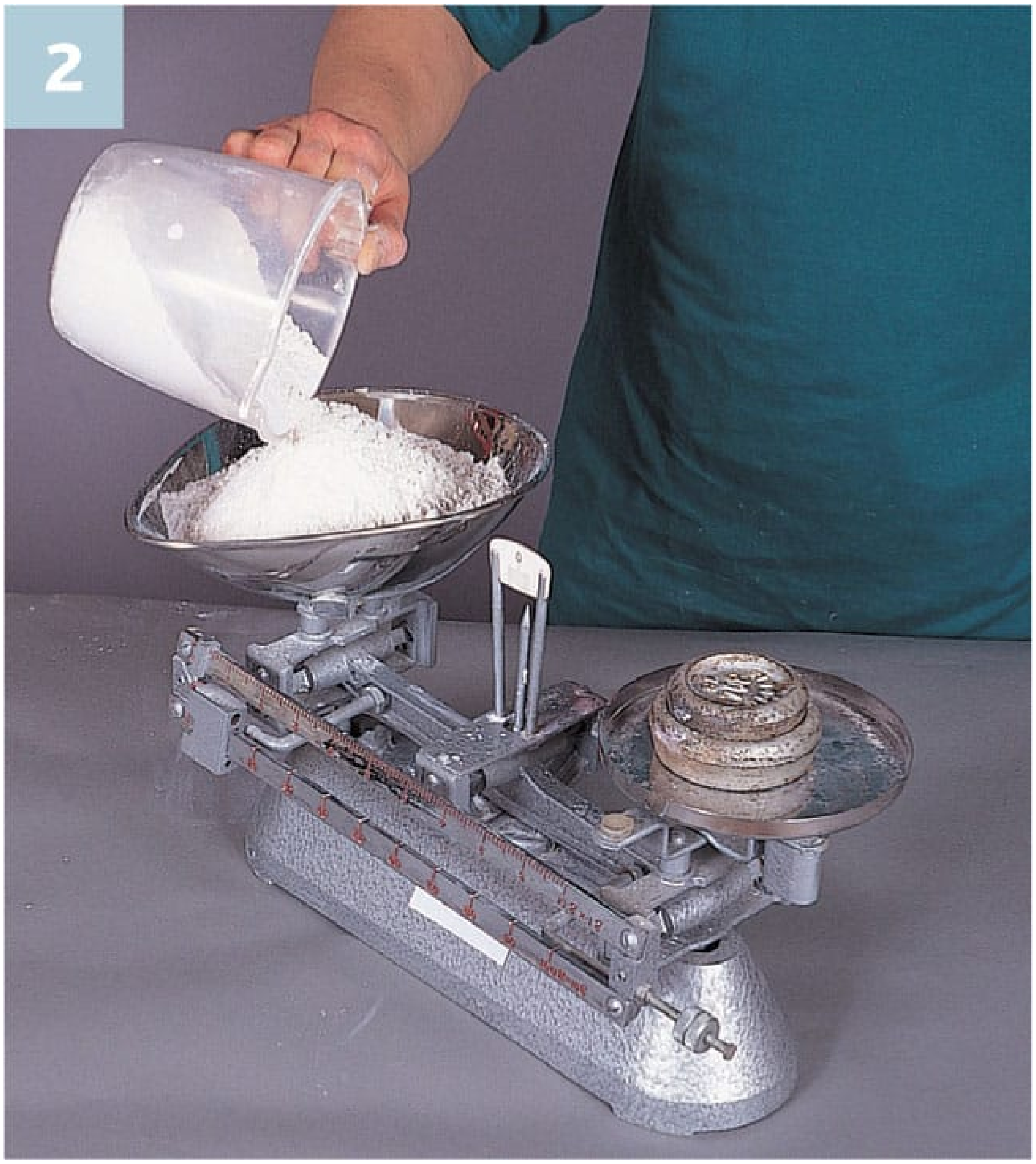
Working with plaster can be a messy business, but it is essential that absolutely no plaster contaminates your clay or glaze. It is vital that all surfaces are thoroughly cleaned after mold making, especially if you use the same space for clay work. Clay used for mold making should be kept in a lidded airtight container, and can be re-used for other plaster work, but never to make pots. Even small amounts of plaster can spoil your pottery.

When the plaster sets a chemical reaction causes it to heat up. You will feel it warm up within moments of going hard. Only when it has cooled down is it strong enough to have the walls removed around the mold and the rough edges of the plaster scraped down.

WARNING

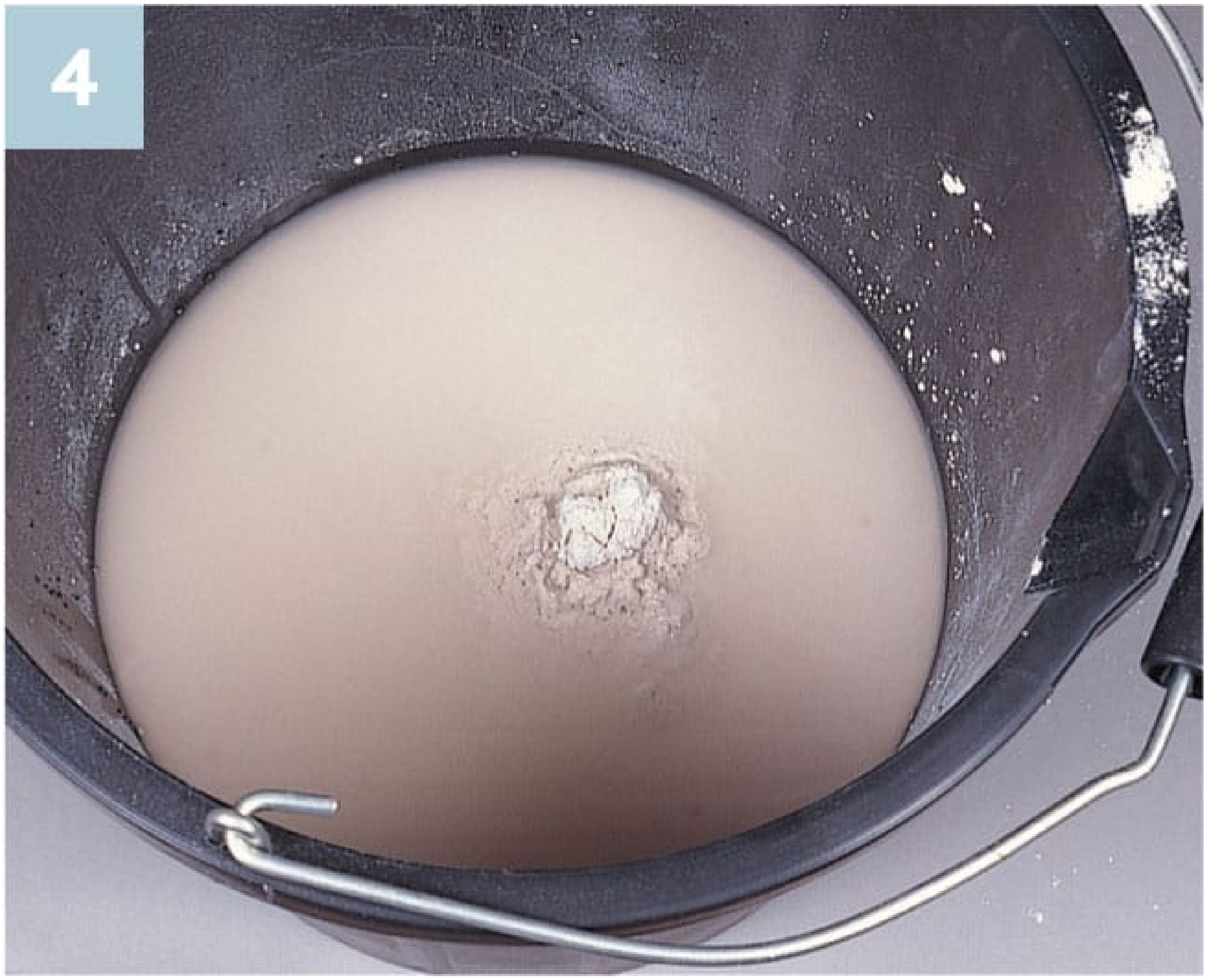
You should wear rubber gloves when working with plaster, as even non-sensitive skin can be adversely affected by contact with it. A face mask with dust filter should always be worn when dealing with plaster dust.

1 Measure the correct amount of cold water needed for the mold. The plaster used here requires 1 pint (575 ml) of water to 1lb.13 oz (77 g) of plaster. If more water is added, the set plaster will be more porous and absorbent but also much softer and easily broken. With less water, the plaster will set harder but will be much less absorbent.



2 Weigh the correct amount of plaster for the mold. Plaster should always be bought fresh and stored in an airtight, lidded container or plastic bag because it absorbs moisture from the atmosphere, causing lumps.

3 Sprinkle the plaster into the water fairly quickly, but avoid putting in big handfuls as this also could create lumps. Sieving the plaster first, using a kitchen sieve bought for the purpose, will help it to enter the water as individual particles.



4 Leave the plaster to stand for one minute to allow it to absorb the water evenly. If you begin mixing too soon, dry pockets of plaster in the mix will form lumps.

5 Now slide one hand down into the plaster mix to the bottom of the bucket. With your arm remaining as still as possible, move your fingers around to mix the plaster and water thoroughly and break any lumps.

6 Finally, gently agitate the container holding the plaster in order to encourage any air bubbles to rise to the surface. This action will form a froth that should be skimmed off the top and thrown away. As soon as the plaster changes from the consistency of milk to that of cream, it is ready to pour into your prepared mold.

Further Information

Press molding, pages 52–53

Thowing: centering

For thrown pots the first technique you must master is centering; the process used to ensure that the clay is positioned in the exact center of the wheel-head. There are many ways of centering the clay, but the most common involves putting pressure on the clay from one side against the centrifugal force of the spinning wheel. Whatever method you use, the principle is the same—position your hands so that the centering pressure is leaning into the direction of the wheel. If your wheel turns counter-clockwise (the most usual), your hands should be at about the 8 o'clock position to push downward. This method will always center your clay, no matter how much you are using.

The position of your body is very important. Your back, shoulders, and neck should be rigid and your upper arms firm and tucked against your sides (this will support your forearms so they are not doing all the work). The clay should be level with your lap and your body should be at a height over the wheel to give stability. At times when more pressure is needed, lock your hands together to provide extra support. You will soon learn how to judge the amount of pressure needed for successful centering.

1 The wheel-head needs to be damp to help the clay adhere, so wipe it with a damp sponge if it is dry. Take care not to wet it too much, however, or the clay will slide off as the wheel gathers speed.

2 Firmly slam the ball of clay down onto the wheel-head, using both hands to prevent it from splaying outward too much. Apply a slight backward and forward movement with your hands to see if the clay is sticking sufficiently. If it is too slippy, wipe off some of the moisture.

3 Set the wheel spinning. When it reaches its fastest speed, place the palms of your hands on opposite sides of the clay. Hold them steady for a few turns, then begin to squeeze inward slightly and lift your hands upward. The clay will rise into a cone shape.

4 When the cone is completed, start to press down on the clay with your thumb. As the mound of clay becomes wider, move your whole hand over the top of it and press down. Use your other hand to give extra support to both the clay and the hand that is pressing down. Lean in to give added pressure.

5 As the cone compacts, push down with the side of one hand while your other hand pushes inward. The combination of both hands squeezing in these two directions will push the clay into the center of the wheel.

6 Run your fingers lightly across the top of the clay; you will easily feel the center point. Supporting the clay with one hand on the outside, begin to press downward with the fingers of your other hand to open up the clay.

Further Information

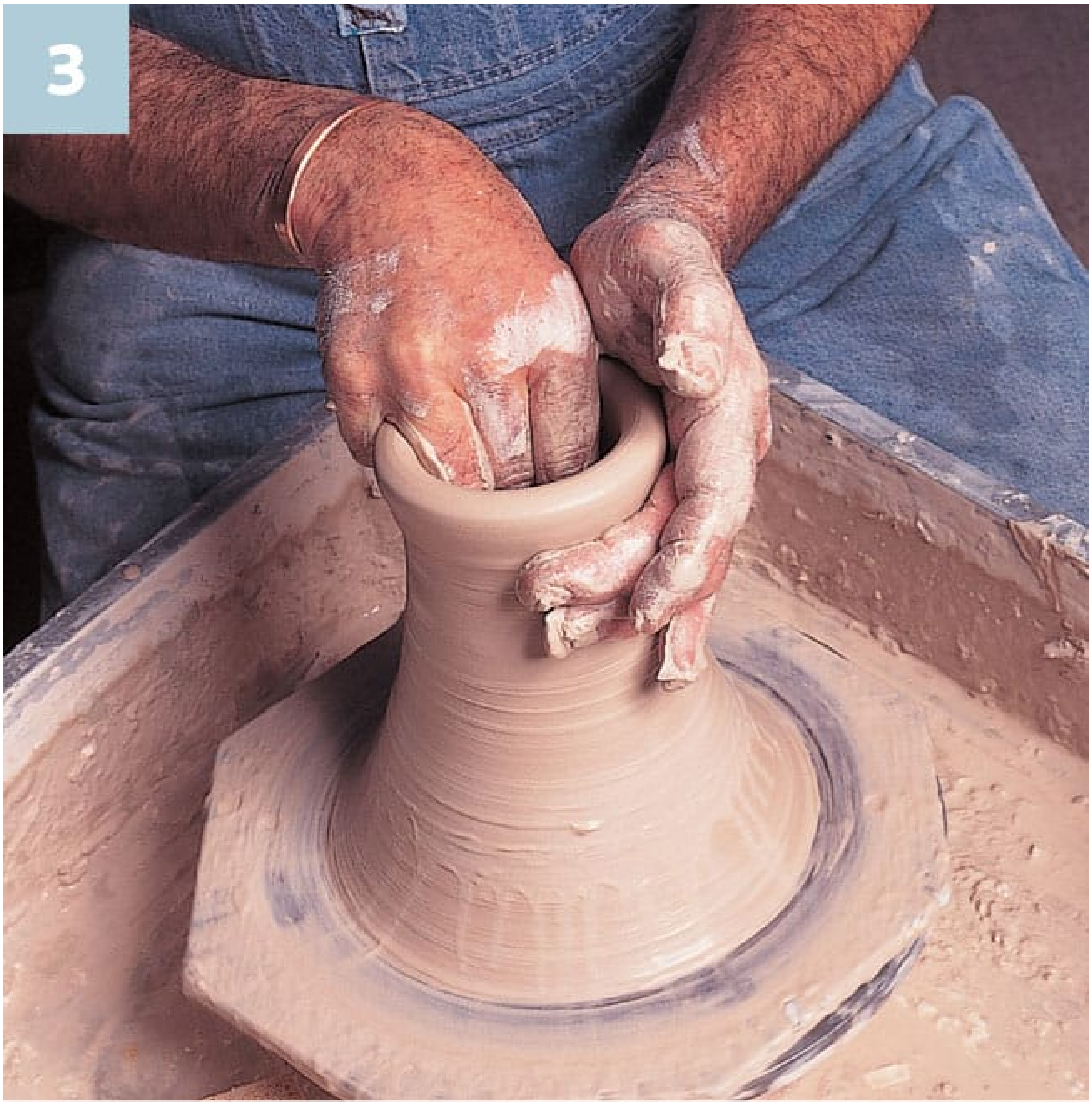
Throwing a cylinder, pages 58–59
Thrown and altered bottle, pages 66–67

Throwing a cylinder

The starting point for all tall pots is the cylinder; most other shapes are variations of it. If you intend to adapt the cylinder into another shape, try to leave the clay thicker in those areas that will be stretched. As with any pottery-making technique, there are no set rules and, with experience, you will find your own methods. As you open up the clay and lift the pot, the wheel should be turning more slowly than when you centered the clay (see page 56). The effects of centrifugal force increase as pots get taller and thinner, so keep reducing the speed or the clay will be flung outward and off the wheel. In the final stages of shaping, the wheel should be only just turning.

1 Push the fingers of one hand down into the centered mass of clay and slowly pull outward. Support the wall of clay with your other hand and lock your hands together for stability. Take care not to push down too far. Until you become more experienced at gauging the thickness, insert a needle to measure the depth of the clay base.

2 Lift the roll of clay between your fingers and thumb to start raising the walls of the cylinder. Use the palm of your other hand to help push up the clay and support the walls so that they do not expand outward too far.



3 With your supporting hand wrapped around the clay, the cylinder will become narrower as it grows upward. This collaring action helps to counteract the centrifugal force of the wheel. Apply pressure with the crook of your other thumb to keep the top of the pot level.

4 With the fingertips of one hand on the inside of the pot and the knuckle of the forefinger of your other hand on the outside, begin to lift the clay. Position your knuckle slightly lower than the fingers inside the pot and press it inward along the wheel-head to gather up a roll of clay.

5 Lift the roll of clay upward in a smooth motion, keeping the pressure even. Pulling up too fast will stretch the clay and cause it to tear. The clay will thin as the pot increases in height. If you squeeze too hard you will thin the wall too much.

6 Repeat the lifting process to thin the walls again and pull the pot taller. Use the final lift to refine the shape and rim, making sure that the clay is of an even thickness. It is always best to lift and shape your pots gradually. When finished use a wire to cut the pot from the wheel-head.

Further Information

Throwing: centering, pages 56–57
Thrown and altered bottle, pages 66–67

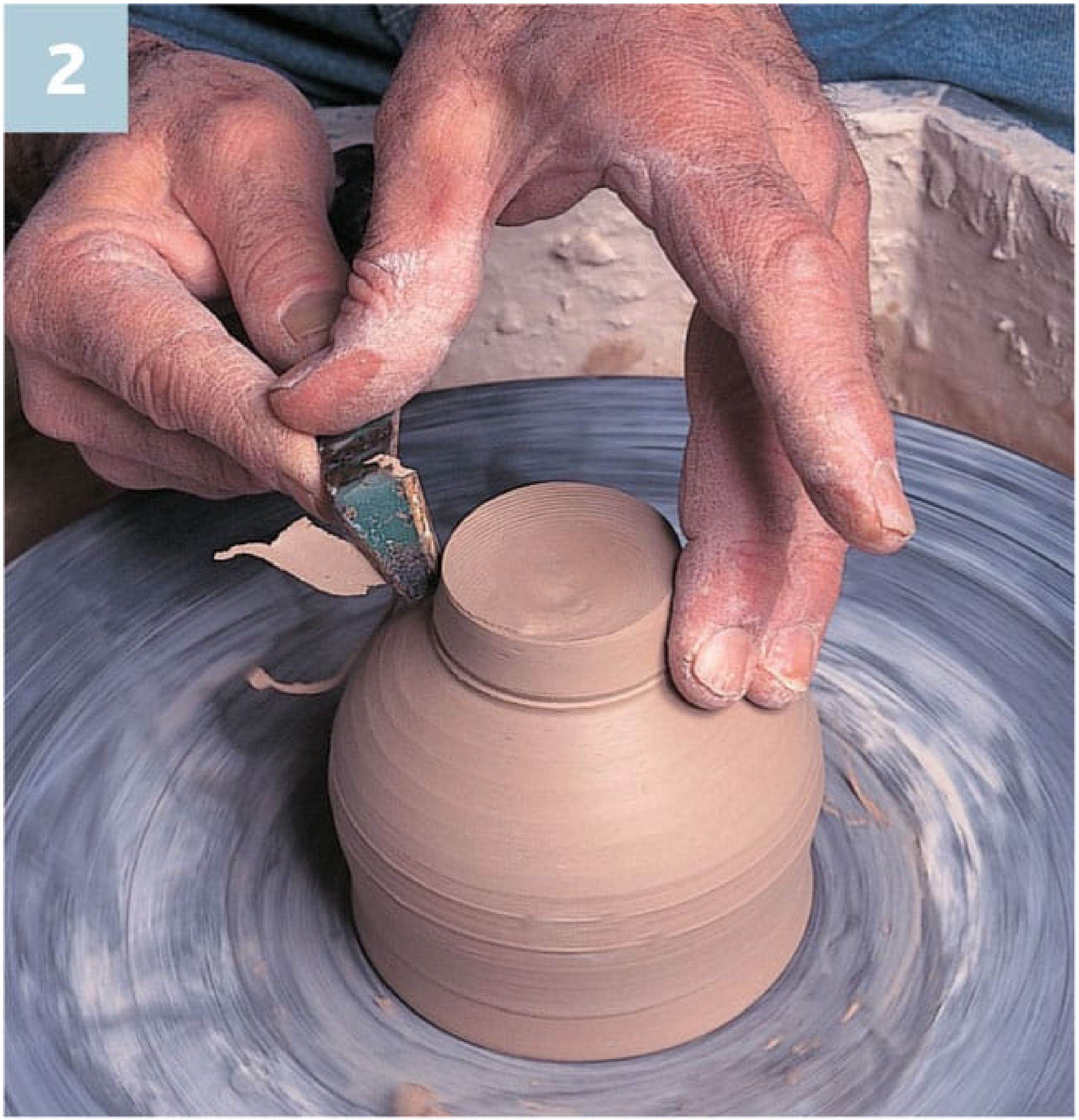
Trimming

This is the process of removing excess clay from the base of thrown forms. It is sometimes referred to as turning because it involves removing excess clay while the pot is rotating. Pots are usually trimmed at the leather-hard stage, when cutting is more precise and the risk of damaging your pots while handling is reduced. You will soon learn the best state of dryness for trimming —too dry and the clay will come off in flakes, too soft and it can distort. The ideal is where the trimmings peel off the surface evenly and clearly.

The main reason for turning is to cut foot rings into the base of pots that could not be achieved or would be difficult to accomplish during throwing. A foot ring gives definition to pottery. Trimming can also be used to refine and narrow bases, giving a pot “lift.” All potters have their own variations on trimming techniques and tools. You can use hand-carved bamboo tools, commercially made metal tools and scrapers, or make your own cutters and scrapers from the metal strip around the edges of packing cases.

Tea-bowl foot ring

1 The pot must be re-centered upside down. Dampen the wheel-head with a sponge, support the pot with one finger and gently tap it to the center of the wheel with your other hand at an 8 o'clock position (if your wheel turns clockwise instead of the usual counter-clockwise, use a 4 o'clock position). You will easily feel when the pot is on center.

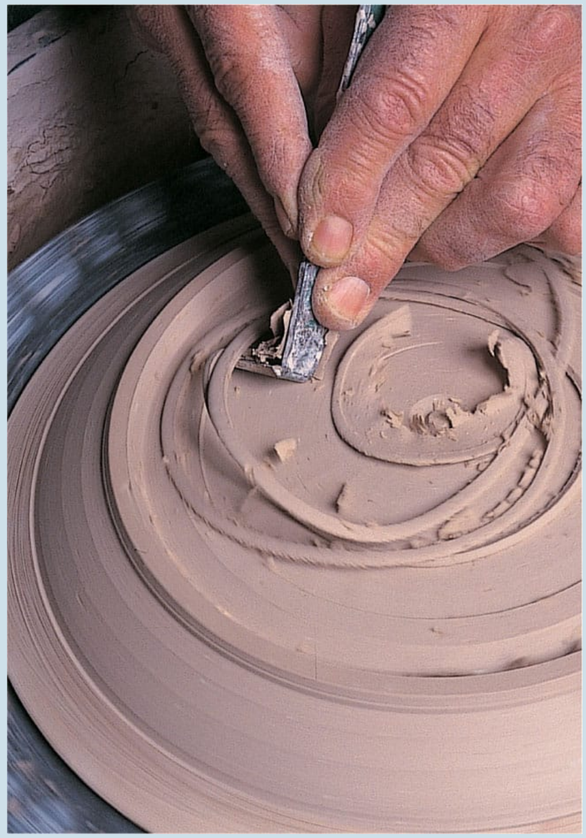


2 Once centered, press the pot down onto the damp wheel to stick it firmly. Begin to trim any surplus clay from around the base to define the outside profile of the foot ring; a commercially bought metal trimming tool is used here.

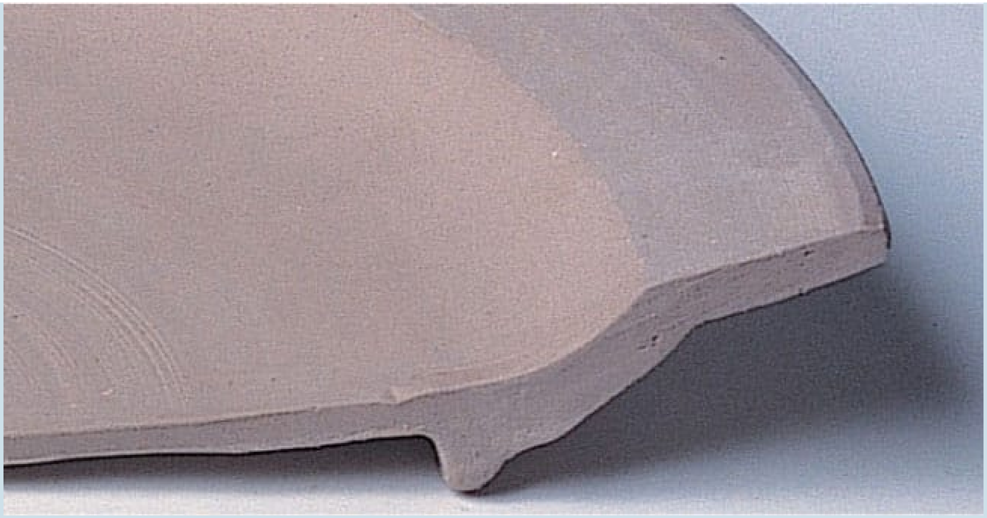
3 Using the same tool, carve into the base of the pot, trimming the foot ring to the desired depth. Take care not to cut through the base of the pot completely. After every few cuts, press the base gently with your fingertips to check the remaining thickness.

Plate foot ring

Secure the plate in the center of the dampened wheel-head and trim a foot ring. If the base of the plate is very wide, you may need two concentric foot rings or, at the very least, a small nipple of clay left in the center to support the base and prevent it from sagging during firing.



This cross-section shows a thrown plate before trimming. You can see the thickness and the excess of clay where the base joins the walls.



This shows the profile of the foot ring. It has been trimmed as wide as possible while still leaving the thickness of clay at the bottom of the wall to support the rim of the plate during firing and prevent warping. The small nipple of clay in the center supports the base of the plate.

Thrown lids

Lids can be made by molding methods, but to achieve an overall consistency of design, lids for thrown pots are usually made by the same method and at the same time as the pot. This also helps to ensure a good fit, as both will shrink at the same rate.

Although lids can vary widely, there are really only a few main types. All lids require some device to keep them securely in place, and this is usually achieved through forming and combining flanges and galleries. Simple inset lids can be formed by throwing totally enclosed shapes. These can be cut rough with a sharp blade in an undulating line when leather-hard, or alternately formed with an integral flange during throwing and cut to fit when leather-dry. Another type of lid is a simple cut or bowl shape which caps the rim when inverted over it. A well-defined ledge for the cup lid to rest on is normally a feature of this type. Similarly lids can rest on internal galleries formed on the pot.

Simple variations on lids and fittings

1 A simple “cup” lid fits snugly over the throat of the pot.

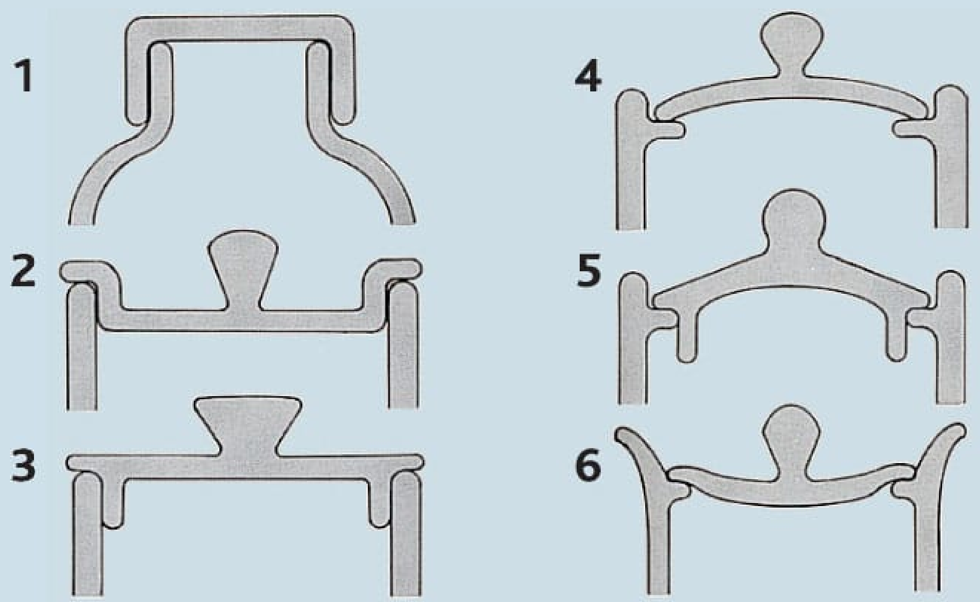
2 This lid can be easily thrown incorporating the knob during the throwing stage. It can be used where the maximum width of the pot is required.

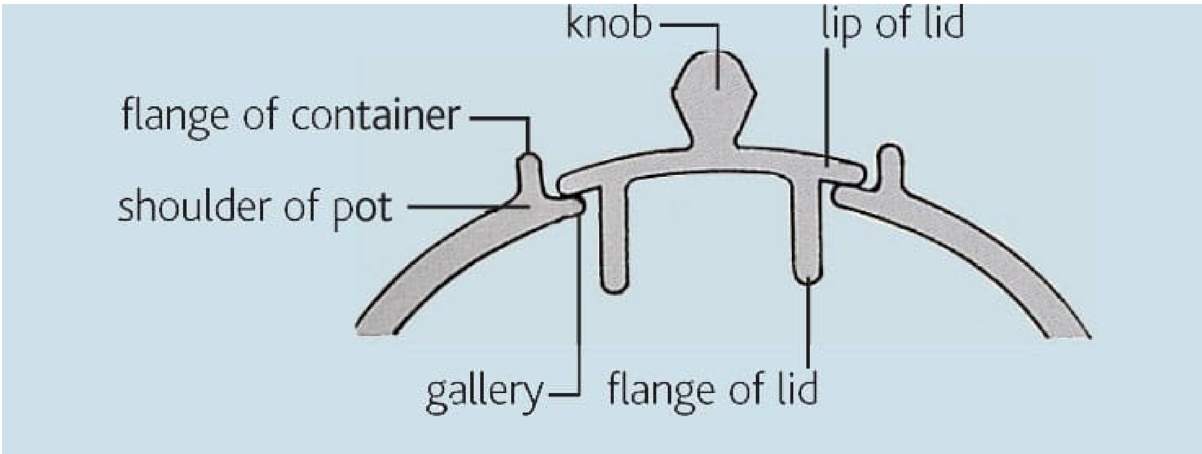
3 This lid can be used on pots with or without internal galleries.

4 A simple flangeless lid sits on an internal pot gallery.

5 A flanged lid combined with an internal gallery is commonly used in articles where a secure fit is required to enable pouring/tipping and so on, as in the teapot.

6 This lid is a simpler version of style number 2.




knob
lip of lid
flange of container
shoulder of pot
gallery
flange of lid

Throwing a lid

1 The simplest form of lid is nothing more than a small bowl or dish shape which, when inverted, forms a cover or cap. Such lids can either fit over and enclose a rim or they can sit on a formed gallery inside the rim.

2 To make a flange lid, begin by compressing the rim to thicken it. Determine where the flange will form and split the resulting thickened rim with your fingernail. Press down steadily on the split section.

3 Here the flange is given sharpness and definition with a tool held at a 90° angle, with the underside of the lid supported with the fingers.

4 Lids thrown in an inverted position will normally require some form of knob or handle. This can be a section of pulled or extruded handle, but an alternative is to throw a small knob directly onto the lid.

5 Score and attach a small ball of clay to the lid, and then use slurry to ensure a good bond between knob and lid surface. Using the minimum amount of water, throw the knob shape from the soft ball of applied clay.

Further Information

Throwing: centering, pages 56–57
Throwing a cylinder, pages 58–59
Spouts and handles, pages 64–65

Spouts and handles

Some pots require spouts for functional reasons, or they may be an esthetic requirement. In either case, a common rule of thumb is to make any additional component parts for an object by the same method of construction throughout. A thrown teapot, for example, will normally be best with a thrown spout, and a slabbed one with a slabbed spout, made by wrapping clay around a former (see page 48). Handles, which cannot be thrown as they are not hollow, can be made by pulling out a section of clay.

Thrown spouts

1 Throw a narrow cylinder on the wheel. You can either use a small lump of clay and hollow it out right down to the wheel-head or, as here, throw the spout "off the hump."

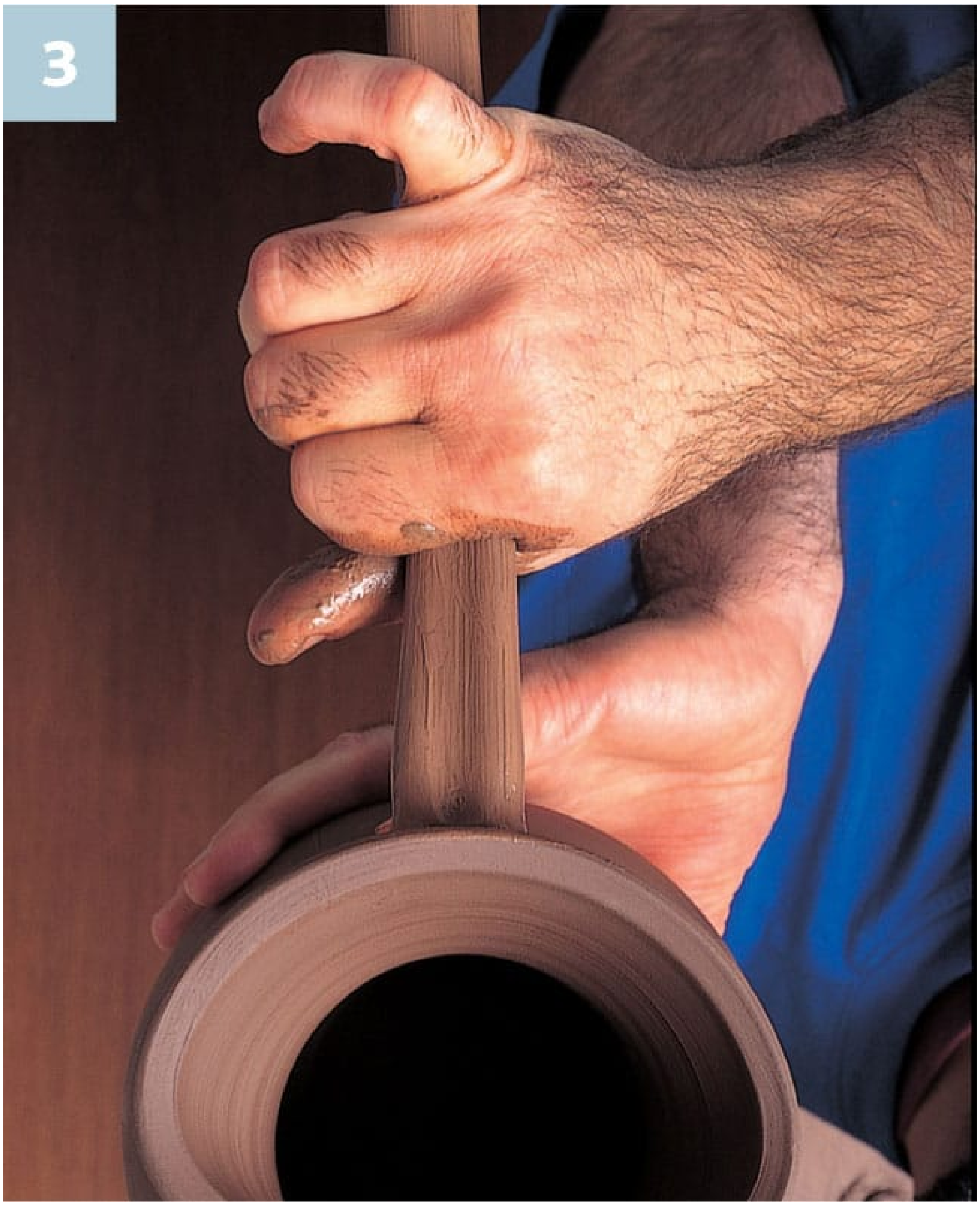
2 Thin the walls of the clay and belly it out lower down. Make the rim nice and smooth, and use a piece of wet chamois leather to compress and smooth the clay. When you are happy with the shape, clean off any surplus slurry with a wooden throwing rib or a plastic scraper.

3 Wire through the spout to cut it from the main lump of clay. It doesn't have to be perfectly flat cut, as you will be trimming this part to the profile of the pot to which it will be fastened.

Pulled handles

1 Make a tapered section of clay from a squeezed, fat coil. Roughen up the thick end with a knife and slurry, and lightly attach it to the rim of the pot. Use a straight stick to line up the handle with the lip; you can also use this method for lining up two handles on an urn.

2 Firmly press the coil onto the rim, and lute it to the rim using a wooden modeling tool. This ensures a good seal.



3 Lubricate your hands and the clay with water, and gently begin to pull the clay through your thumb and forefinger, slightly squeezing as you do so, while you hold the jug horizontal in your other hand. Continue until the handle tapers evenly toward the bottom.

4 Bend the handle gently over and break it at the right length by squeezing it off between your fingers; it will bend naturally into a pleasant arc. Join it firmly to the lower part of the jug with your thumb, and smooth it into the body.

Further Information

Coiling, pages 42–43
Throwing a cylinder, pages 58–59

Thrown and altered bottle

As you become more confident with throwing on the wheel, you can make more difficult shapes. This project is a classic Oriental form—a thrown bottle that is decorated by altering its shape with textured paddles.

YOU WILL NEED:

- Stoneware clay
- Throwing rib

- Potter’s knife
- Sponge
- Sponge stick
- Turning tools
- Wooden paddle
- Coarse string
- Glaze

1 Prepare a spiral-wedged lump of about 5 lb (2.2 kg) of lightly sanded stoneware clay, center it on the wheel, and open it out into a wide cylinder, leaving a good 3/4 inch (18 mm) thickness at the base. Smooth the inside of the base into a concave shape that gradually meets the walls.

2 Pull up the sides into an inward-sloping cylinder, keeping the walls an even thickness. Use only enough water to let your fingers slide on the surface. Don't pull too quickly, or you can thin the clay lower down too much and the walls will collapse.

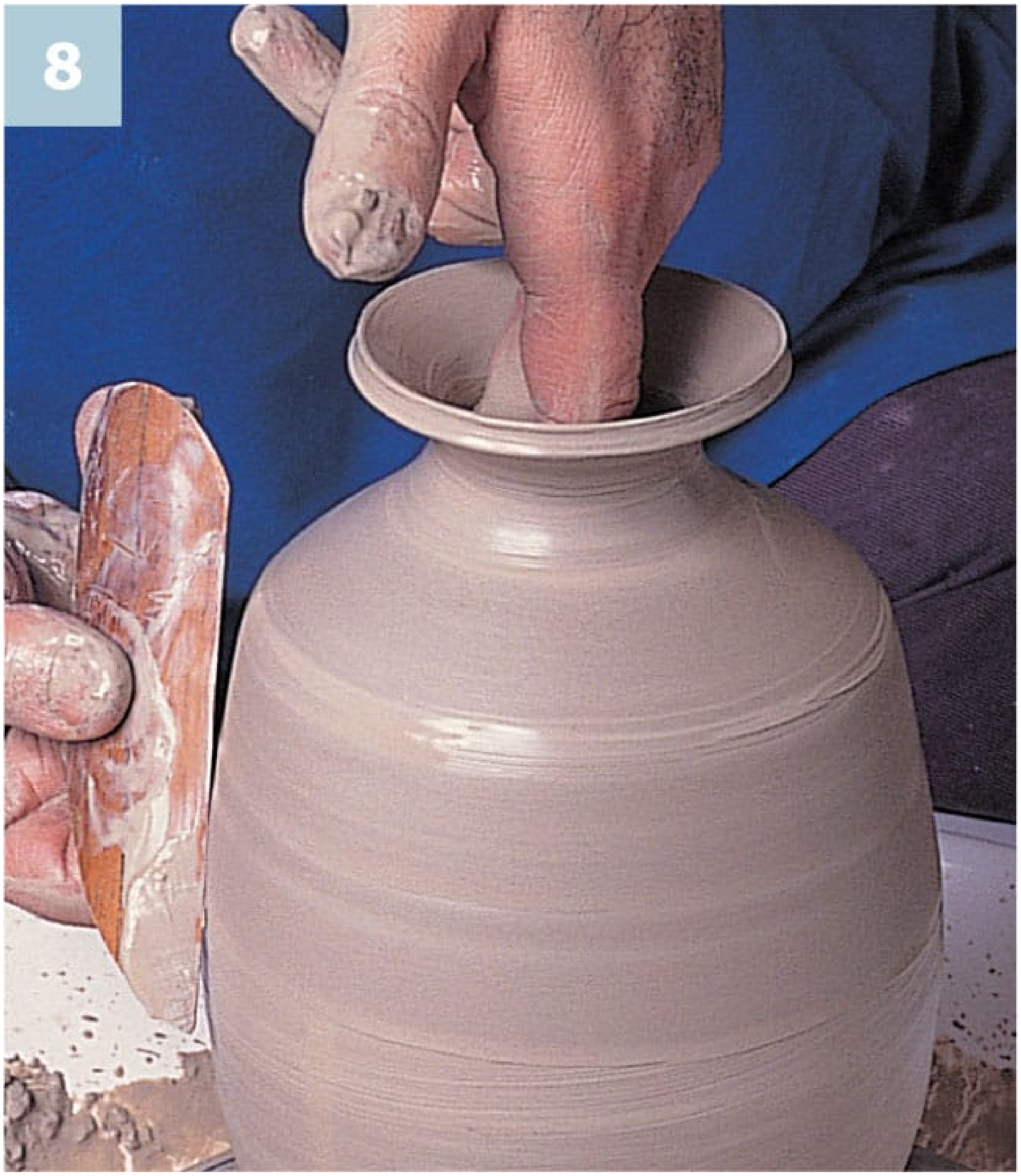
3 Using the knuckle of the forefinger of one hand, start to “knuckle up” the walls while supporting the clay on the inside with your other hand. Steady your hands together by placing the thumb of your inside hand onto the hand pulling the outside. Gently lift the walls taller and thinner.

4 Press your knuckle in at the base again and lift the final pull of clay. This thins the walls to about 1/4 inch (6 mm) and takes the bottle to its intended height. Keep a thicker ring of clay at the rim, to be shaped last of all.

5 Belly out the walls slightly, and start to thin and open up the neck of the bottle. Keep gently pushing out the central area of the pot to achieve a slightly rounded appearance.

6 Use a sponge stick to remove any excess water from inside the pot. Carefully holding the stick in one hand, and with the wheel rotating, lower the sponge into the bottle, pull out and squeeze off the moisture. Repeat until you are sure no water is left.

7 Trim the rim with a potter's knife, then smooth over it with a sponge and make any adjustments to the shape. Look carefully at the profile of the bottle to make sure you are happy with the form.



8 Use a rib to clean off any slurry from the outside of the bottle to make it easier to pick up off the wheel-head. The clay should not be too sticky to the touch, or you may leave unsightly fingerprints.

9 With the sharp point of the rib, trim off the excess clay at the base, until it is the approximate final shape. Cut the bottle from the wheel-head with a wire, and leave to set up on a wooden board before trimming the foot ring (see page 60).

10 When the bottle has stiffened to leather-hard, use a wooden beater with string wrapped around it to slap the sides firmly but not too hard. Begin with the two sides opposite each other and then the remaining two sides. The string gives an interesting texture to the flattened panels.

The finished pot
The bottle was bisque-fired to 1000°C (1832°F). The soft quality of the clay is retained by the rounded corners and the indentations. It was then glazed with various colors of stoneware using the pouring and dipping methods (see page 130), and was fired to 1280°C (2336°F). The glaze has fluxed and run into all the textures, building up a slightly thicker deposit that gives a subtle color difference, enhancing the impressed decoration.

Further Information

Trimming, pages 60–61
Stamping and rouletting, pages 78–79

Hand-built pots

The works shown here demonstrate how both simple and sophisticated forms can be achieved by various hand-building methods, making them ideal for decorative treatments when leather-hard or bisque fired.

NON-FUNCTIONAL WARE

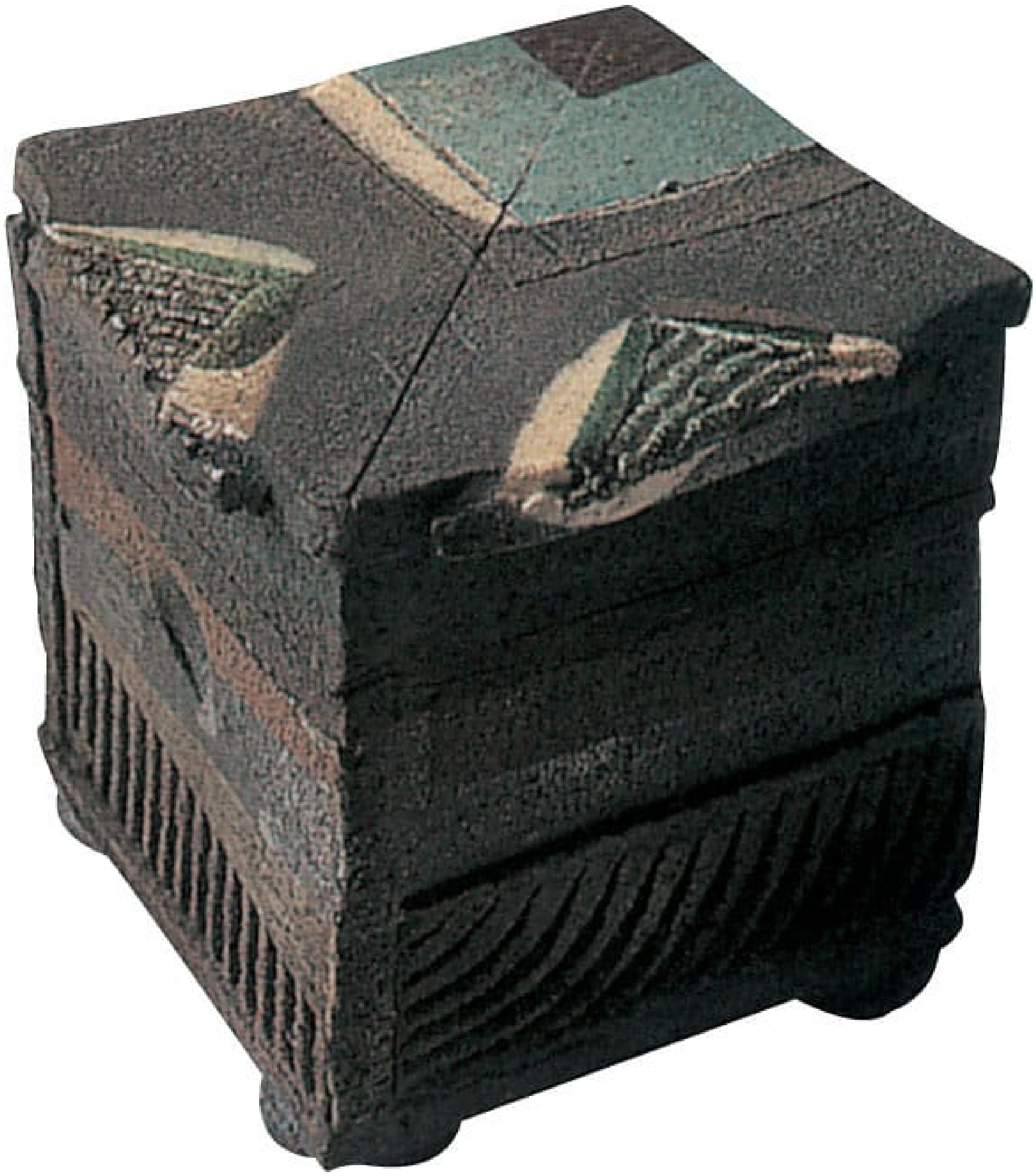
This lovely coiled and burnished pot by Magdalene Odundo was made for decoration rather than use. Notice how the spout grows simply from within the form, beautifully poised, and balanced by the two ring handles.

COMBINED TECHNIQUES

This bread bin by Morgen Hall was made by combining three hand-building methods: coiling, pinching, and slabbing. The base was slabbed, because large, flat bases made by coiling have more tendency to crack. It was bisque fired, then decorated with glaze stains over resists (see page 116), and after adding a final layer of semi-transparent glaze, was fired to 2084°F (1140°C).

PRESS MOLDING

Surfaces of simple, shallow press-molded dishes offer enormous potential for highly decorative surfaces. John Ablitt has used a variety of different colored slips to produce the precise geometric design on his burnished dish. It has much in common with textile patterning.

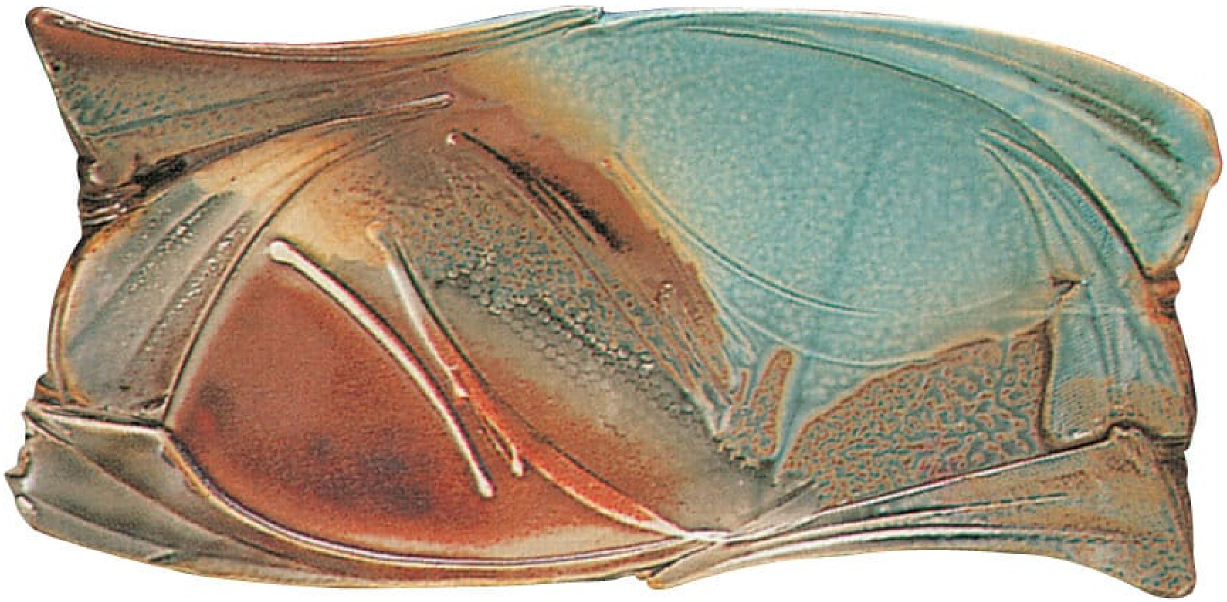


RAKU BOX

A variety of textured slabs form the body of this small box by Tim Proud. Constructed initially as a cube, the lid was cut off and small strips of clay added inside the box to hold the lid firmly. The piece was raku fired using transparent and copper-bearing glazes to about 1830°F (1000°C).

SLABBED FORM

The smooth, burnished surfaces of this slab-built pot by Jacqui Atkin form the perfect base for the dark, intricate decoration. The patterns were created with narrow lines of masking tape, then a refractory slip was applied and the piece was smoke fired in newspaper. The slip was chipped off after smoking to reveal the carbonized areas in the body.



SLABBING ROUNDED SHAPES

The rounded contours of this slabbed tray by Steven Hill are reminiscent of the Art Nouveau style. The impressed and slip-trailed surface treatment and multiple glaze applications combine to create a highly decorative yet functional object.

Thrown pots

Throwing pots has a long history, dating back to beyond 2000 BC, and although potters' wheels have been refined over the centuries, the essential methods remain the same. Throwing enables a large range of objects to be created, mostly stemming from simple basic shapes such as plates, bowls, or cylinder forms.

CYLINDER VASES

This series of celadon-glazed porcelain cylinders by Joanna Howells has a restrained quality that encourages contemplation. Thrown on the wheel, they were gently pushed into oval forms, a method known as altering.

LIDDED CYLINDERS

These refined cylindrical vessels by Chris Keenan were thrown using a fine porcelain body. They were reduction fired (see page 175) in a propane gas kiln to 2300°F (1260°C). A fine line of contrasting tenmoku glaze (see page 163) meanders around the forms.

INSPIRATION FROM NATURE

In Lucie Rie's simple but elegant bowl the delicate pink blush and thin incised lines radiating from the center, encased between the bands of heavy color at rim and foot, are reminiscent of fungi, as is the honest simplicity of the form.

GOBLETS

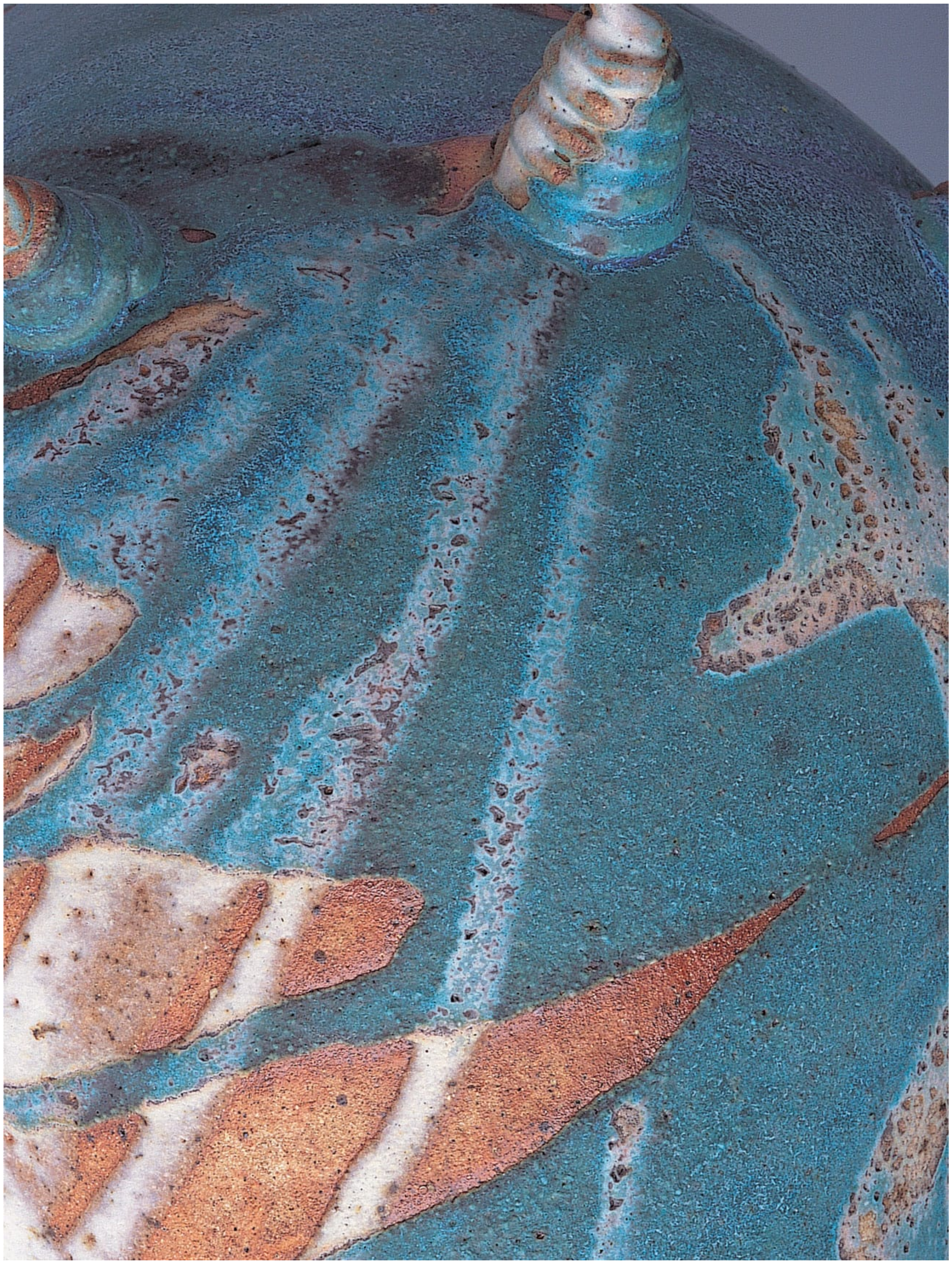
Goblets are not easy shapes to make and often tend to be rather curved and voluptuous pieces. Here John Calver has set a restrained beaker shape on a thrown baluster stem, making a quiet dignified shape, ideal for its purpose. The body is stoneware.

CONSISTENT DESIGN

The immediacy of the throwing method encourages a fluid quality such as that seen in Steven Hill's splendid thrown teapot. The spout has been seen not only as an essential functional requirement, but also as a carefully considered part of the overall shape and design in relation to body, lid, and handle.

CHAPTER 3

TEXTURE AND PATTERN



Now that you have mastered the basic skills of making pots, you can begin to really enjoy yourself by decorating your work in a variety of ways. Many of the techniques explained in this chapter are surprisingly easy, though others do take a little more practice, so you must be prepared to make mistakes initially—trial and error is a vital part of the learning curve.

Incising and sgraffito

Incised decoration is made by cutting into the clay surface. The type of tool used and the dryness of the surface will determine the quality and definition of the cut edge. Lines cut into wet clay with a pointed instrument will produce very immediate designs with burrs along the edges, while incising a leather-hard surface with a sharp blade will produce very precise edges.

Traditionally, incised decoration is covered with a pale-colored but transparent celadon-glaze (see page 163), which accentuates the layered decoration beneath. Rubbing coloring oxides into the decoration before glazing will accentuate the design further.

Sgraffito is the term used for scratching through a colored slip or glaze to reveal the clay beneath. Although very easy, it has the potential for producing extremely intricate and varied effects.

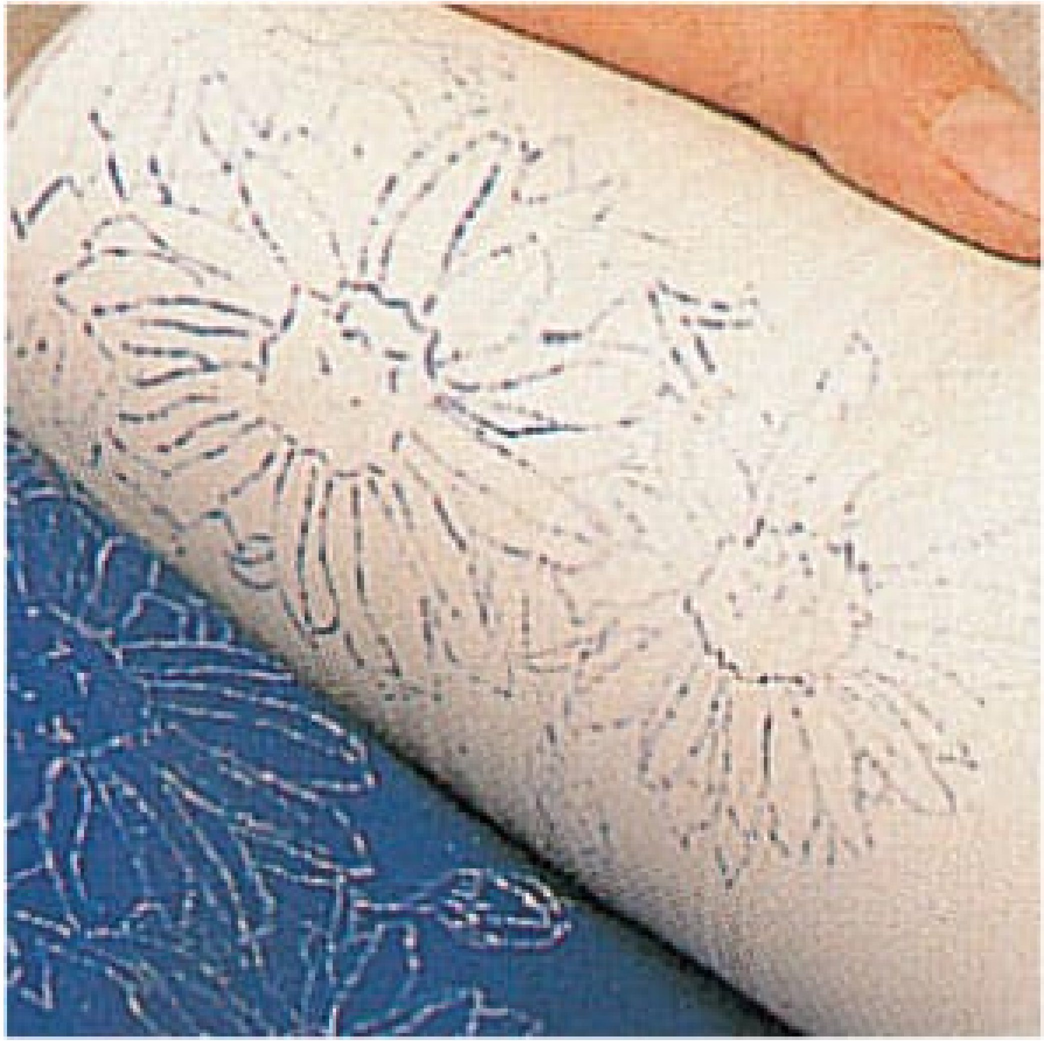
Intricate sgraffito designs can be lightly drawn first on a leather-hard or very dry surface with a pointed tool, or they can be traced on over a carbon backing.

Designs for incising

Although the most flowing and fluid incised decoration results from working freehand, this may initially seem a little daunting. Where the clay surface is soft or leather-hard, designs can be traced on by drawing over the design. This provides an effective guide in the form of a slightly indented line.

Different incised effects

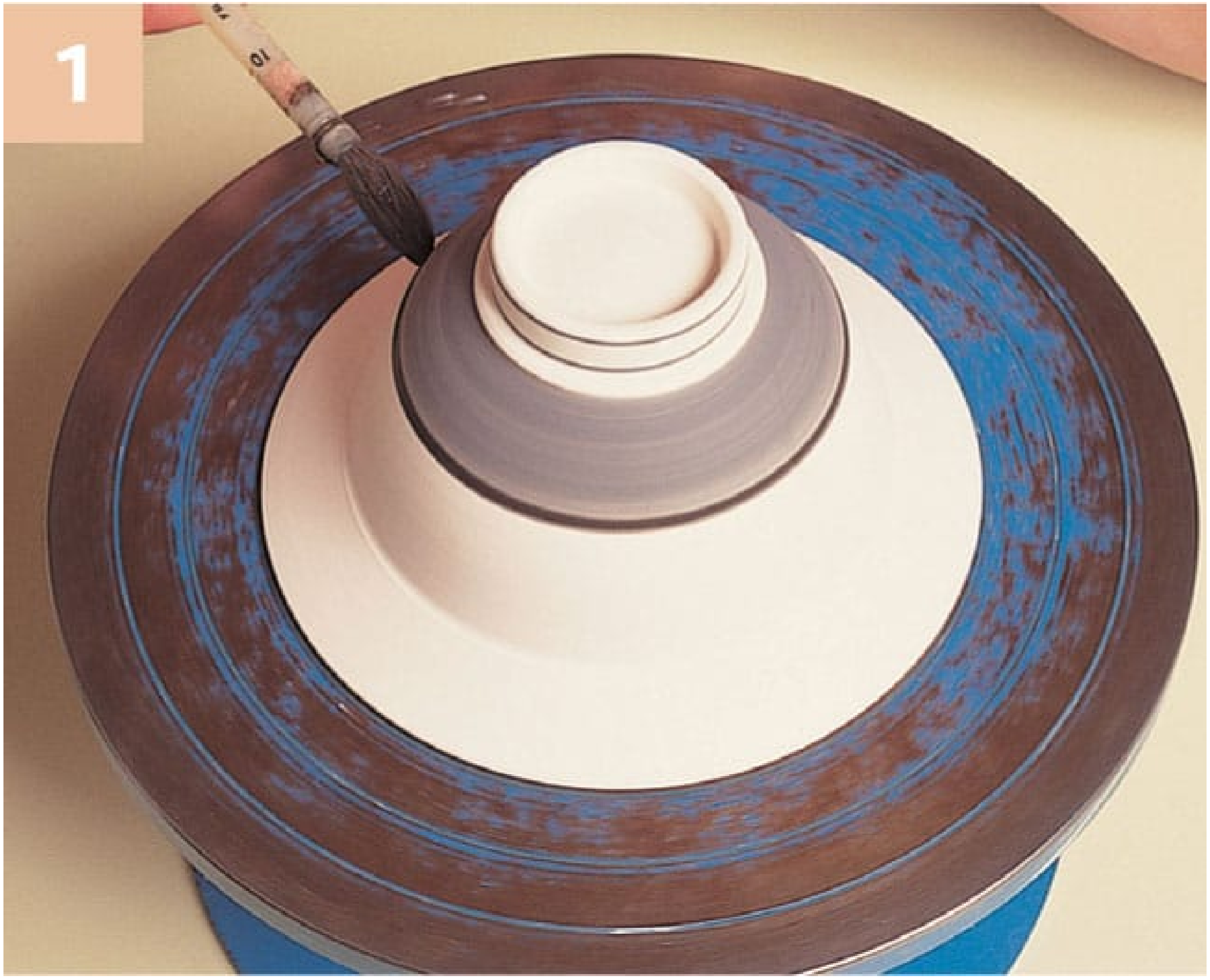
The quality and definition of the incised line is determined by the tool used and the dryness of the clay. These four slabs of clay show the same line cut into clay surfaces which vary from soft (left) to bone dry (right). Notice how the shaving pares off cleanly when leather-hard, but is reduced to dust at the bone-dry stage.



Tracing designs

Tracing paper backed with a sheet of carbon paper can be used to transfer a design onto the clay surface. This leaves a dark line that is easy to follow.

Sgraffito through slip



1 A bowl is centered on a banding wheel and an intense black vitreous slip is banded onto the outside.

2 An excise knife is used to draw fine lines, which cut through the surface color to the clay beneath.

Tools for sgraffito

There is a huge variety of proprietary sgraffito tools available offering different widths of nib, but it is also possible to adapt any pointed tool to achieve sgraffito effects.

3 The piece is almost complete. When dry, it will be fired to 2336°F (1280°C) without a glaze.

Further Information

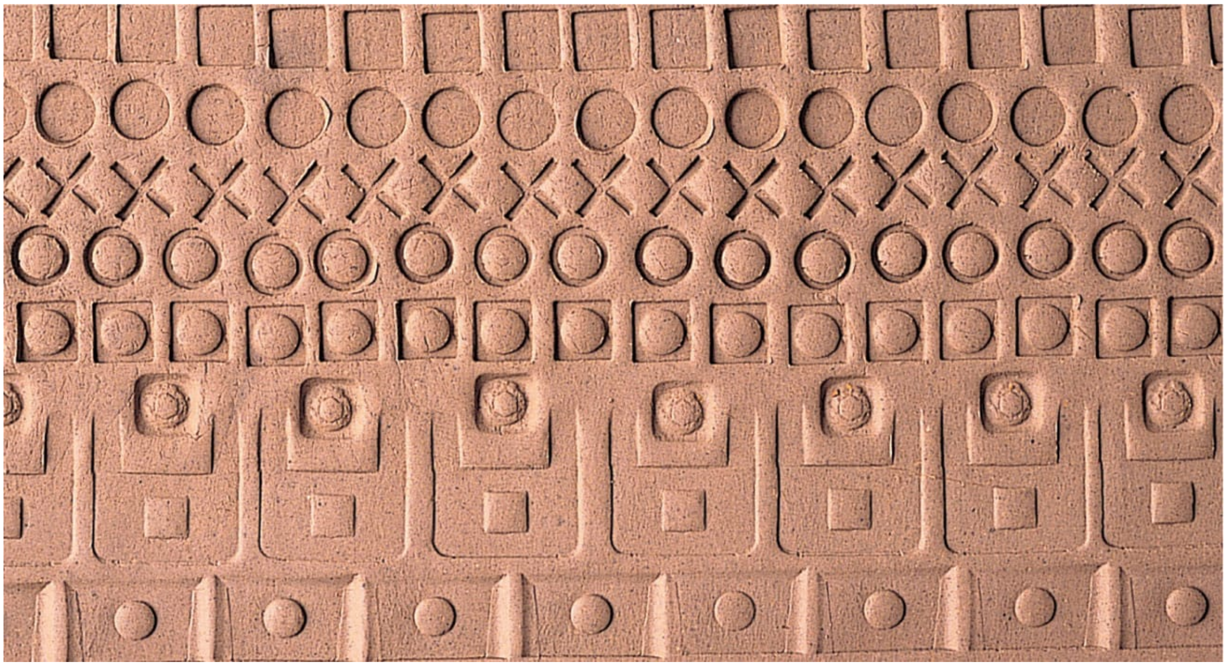
Banding and combing, pages 112–113
Glaze recipes, pages 160–167

Stamping and rouletting

Stamping, sometimes called impressing, is one of the most natural and effective forms of decoration, and involves no more than making marks by pressing objects into the clay surface. This is done while the clay is still soft enough to take the impressions without cracking or splitting, yet firm enough to give crisp definition. Clay can also be pressed or rolled onto textured materials such as rough woven textiles or netting, old terry bath towels, or even aluminium foil to produce a variety of subtly patterned surfaces.

Rolling, or rouletting, is similar, but in this case repeated marks and patterns can be made in the surface of clay by using simple textured rollers, which can be bought or improvised. Roulettes have since early times been a popular means of achieving narrow bands of textured pattern on the outsides of freshly thrown ware, and the technique is still much used on ware of a functional nature today. Rolled decoration can also be used to good effect to produce patterned sheets of clay, which can then be used in slabbing methods (see page 46).

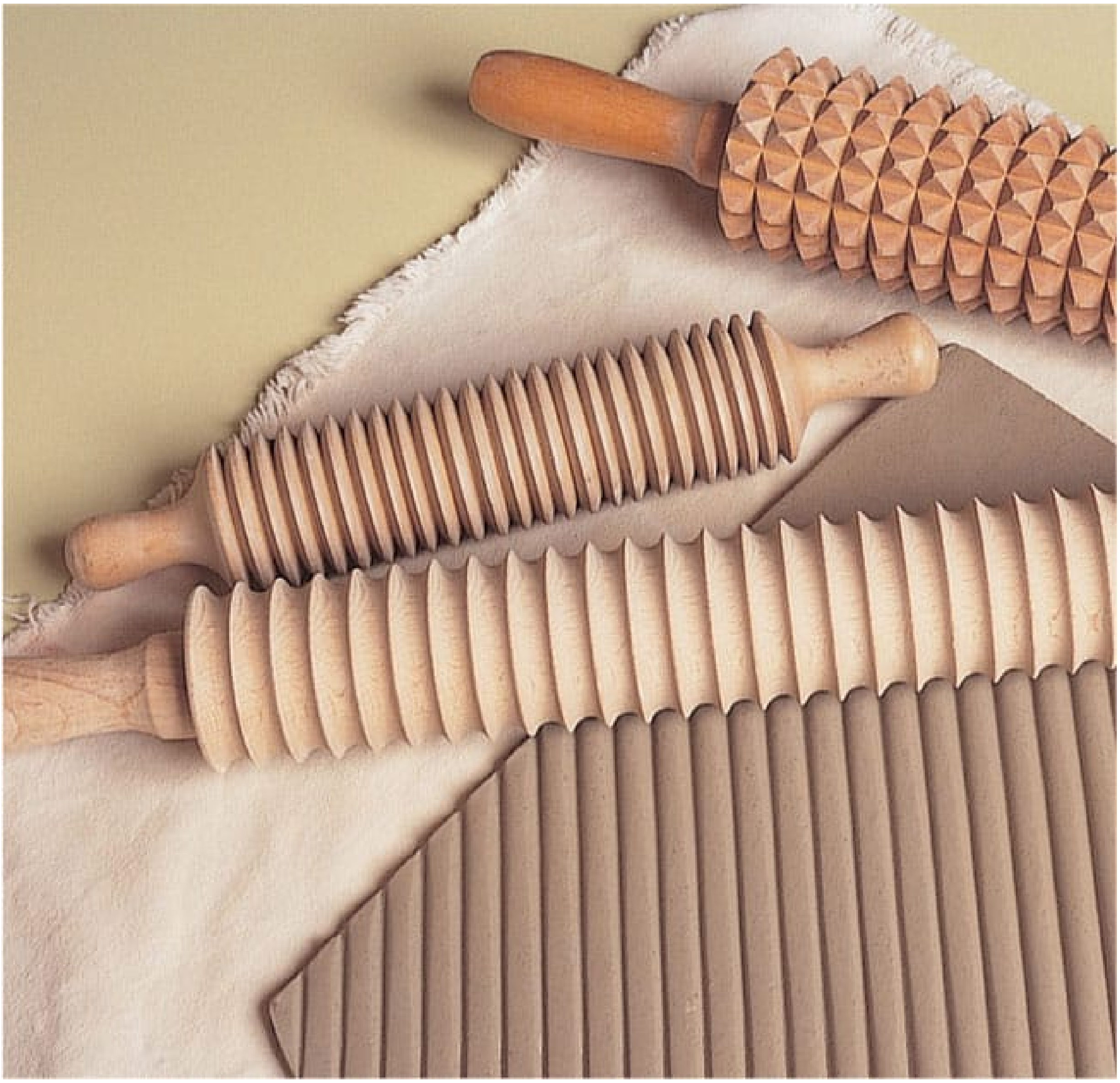
Clay stamps
Stamps can be made from modeled clay coils and, once fired, are quite durable. They can be pressed directly into the clay surface, or into a separate soft pad of clay which is then added to the surface to produce a raised, embossed effect. The latter is most suitable when the clay has hardened.



Stamping simple shapes
Organized bands or layers of patterns can be built up using very simple shapes, which produce rich textural patterns.

Clay roulettes

A variety of textured rollers can be made by rolling soft clay coils over textured materials. When dry these can be fired to form permanent texture rollers. Bisque-fired rollers can be impressed into sheets of soft clay to produce textured slabs, which in turn can be used to construct a variety of slabbed forms. Narrow roulettes are an effective means of impressing bands of texture and pattern into the surface of newly thrown pots.



Textured rolling pins
You can buy roulettes from pottery suppliers, improvise them, or make your own from scratch. These textured rolling pins (intended for the kitchen) are excellent tools for use on a flat clay surface.

Improvised roulettes
Clockwise from top right: old machine part (**1**); antique kitchen implement (**2**); purpose-made roulette with detachable plastic belt (**3**); small print roller (**4**) improvised roulette using wire handles from print rollers to hold small machine parts (**5**).

FURTHER INFORMATION

Slabbing, pages 46–49
Incising and sgraffito, pages 76–77
Inlaying, pages 80–81

Inlaying

Attractive decorative effects can be made by filling incised or stamped recesses in the clay surface with clay of a different color. This technique, variously referred to as inlay, Mishima, or marquetry, was used widely in the decoration of English medieval tiles.

The recesses can be thin lines or larger areas dug out of the leather-hard surface. The shrinkage rate of the inlaid clay should be the same as that of the pot, or cracks will appear as the two clays separate, so it is best to use only one base clay and add coloring stains for the inlay.

Where colored slips are used for the inlay, as in the Japanese Mishima technique (see page 82), which uses contrasting black and white, the slip is best left until very sticky before use. A fine grog can be added to slips used for inlay in order to reduce shrinkage.

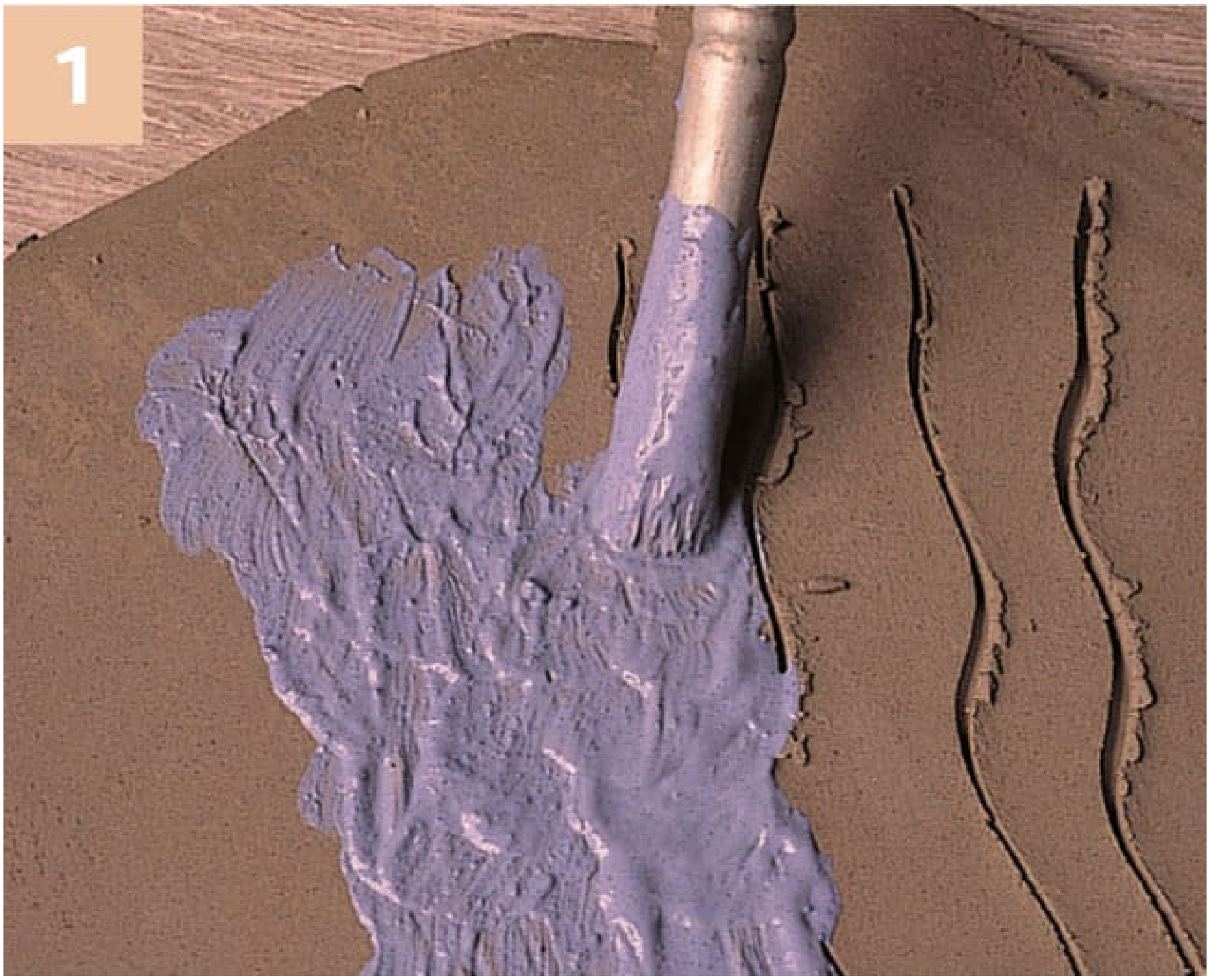
Inlaying colored clays

1 Here defined pattern areas have been dug from a leather-hard surface into which colored clays are to be inlaid. The dug-out areas are scored and dampened to assist adhesion of the clay.

2 The colored clays are then pressed firmly into place with some surplus above the surface. The inlay is left to stiffen before any attempt is made to tidy the pattern.

3 Once the clay has stiffened sufficiently to be scraped, a suitable blade or flexible steel object can be used to reveal the precise inlaid decoration.

Inlaying with colored slips

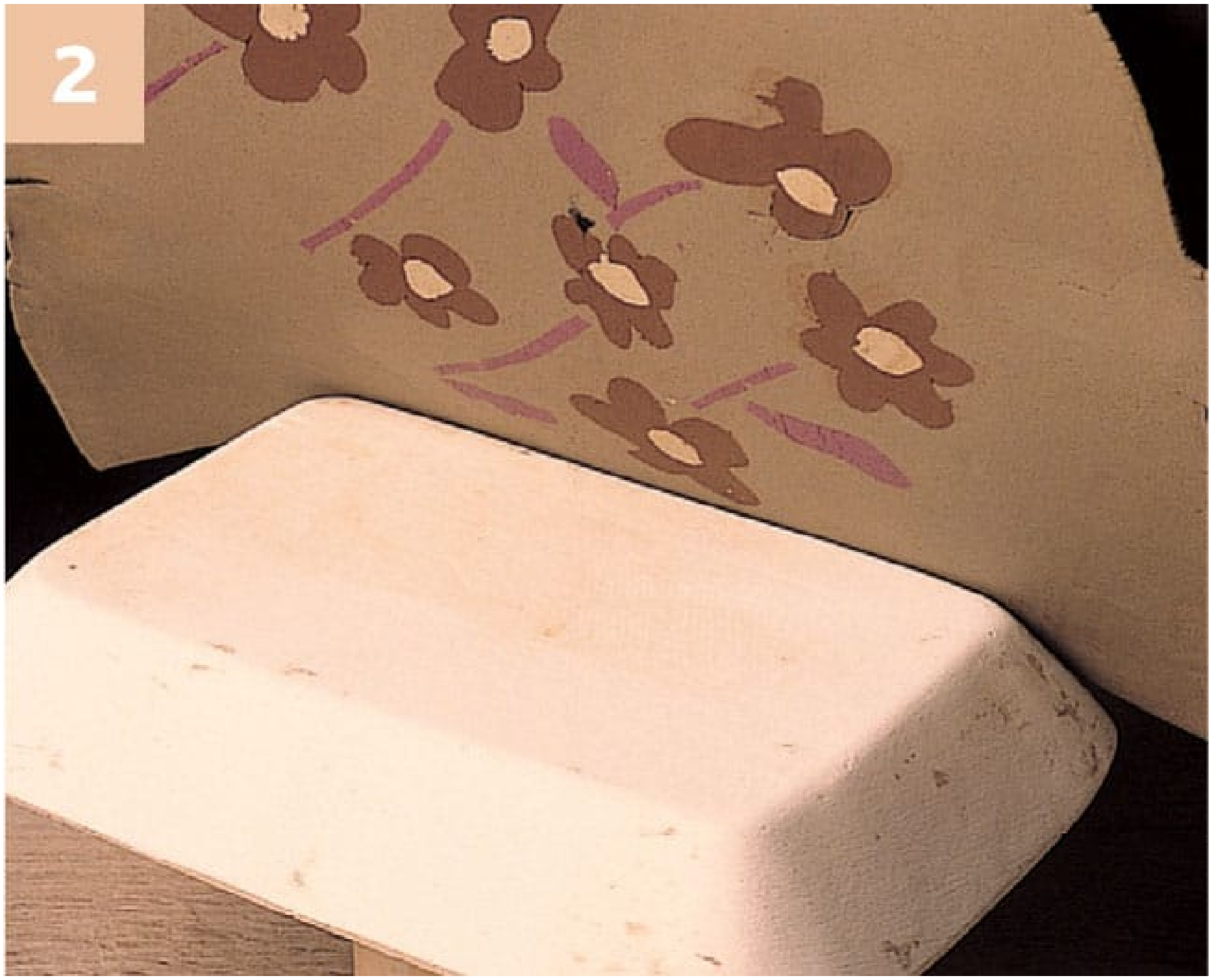


1 Inlaying can be done by filling incised lines with thick colored slips. The risk of the slip shrinking and causing cracking can be reduced by adding fine grog.

2 The inlaid slab of clay can then be formed over a suitable mold, or used in slabbing techniques. In this instance, a hump (inverted) mold is being used, so that the inlaid surface becomes the inside of the shallow rectangular dish.

Ready-cut motifs

1 An alternative form of inlay decoration is to prepare thin colored-clay motifs and roll a sheet of soft clay over them. Here, motifs have been cut and laid out over a porous surface. A slab of soft clay is then placed over the motifs and rolled with an implement such as a rolling pin. The colored-clay motifs are taken up into the clay surface to become embedded or inlaid into it.



2 When the lines have been filled, the slip is left until the surface has stiffened. Once leather-hard it can be scraped with a flexible smoothing tool or other suitable object, removing the surplus slip and revealing the thin lines of color.

Further Information

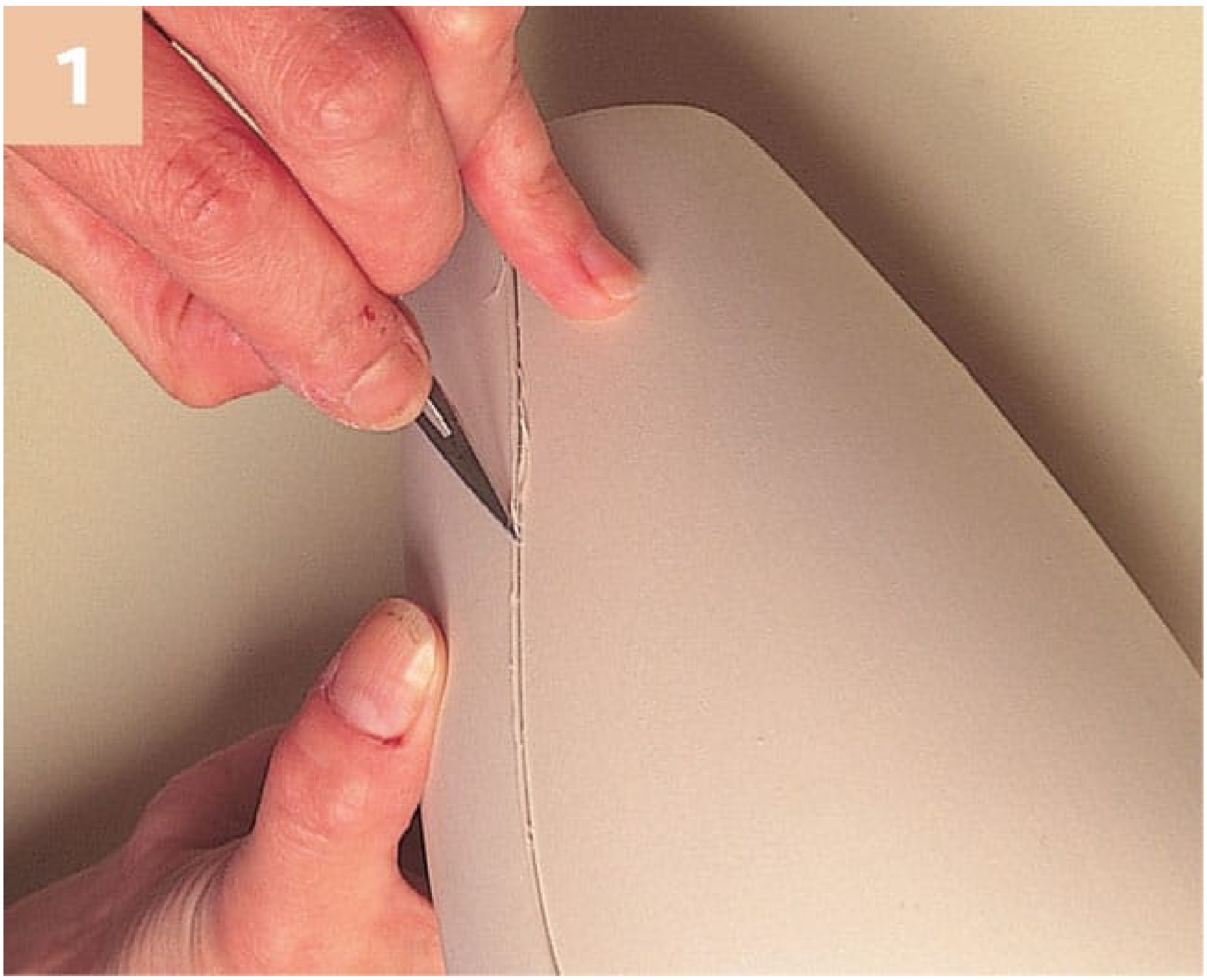
Colored clay, pages 26–27
Slabbing, pages 46–47
Press molding, pages 52–53

Mishima vase

This ancient Japanese art needs patience and a steady hand, but yields elegant results. The vessels shown here are slip-cast in porcelain, which gives a smooth white background well suited to this delicate decoration. The slips are also made from porcelain, with the addition of body or slip stains.

YOU WILL NEED:

- Craft knife or other incising tool
- Colored slips
- Paintbrush
- Leather-hard piece (here a vase)
- Metal kidney palette
- Wet-and-dry glasspaper

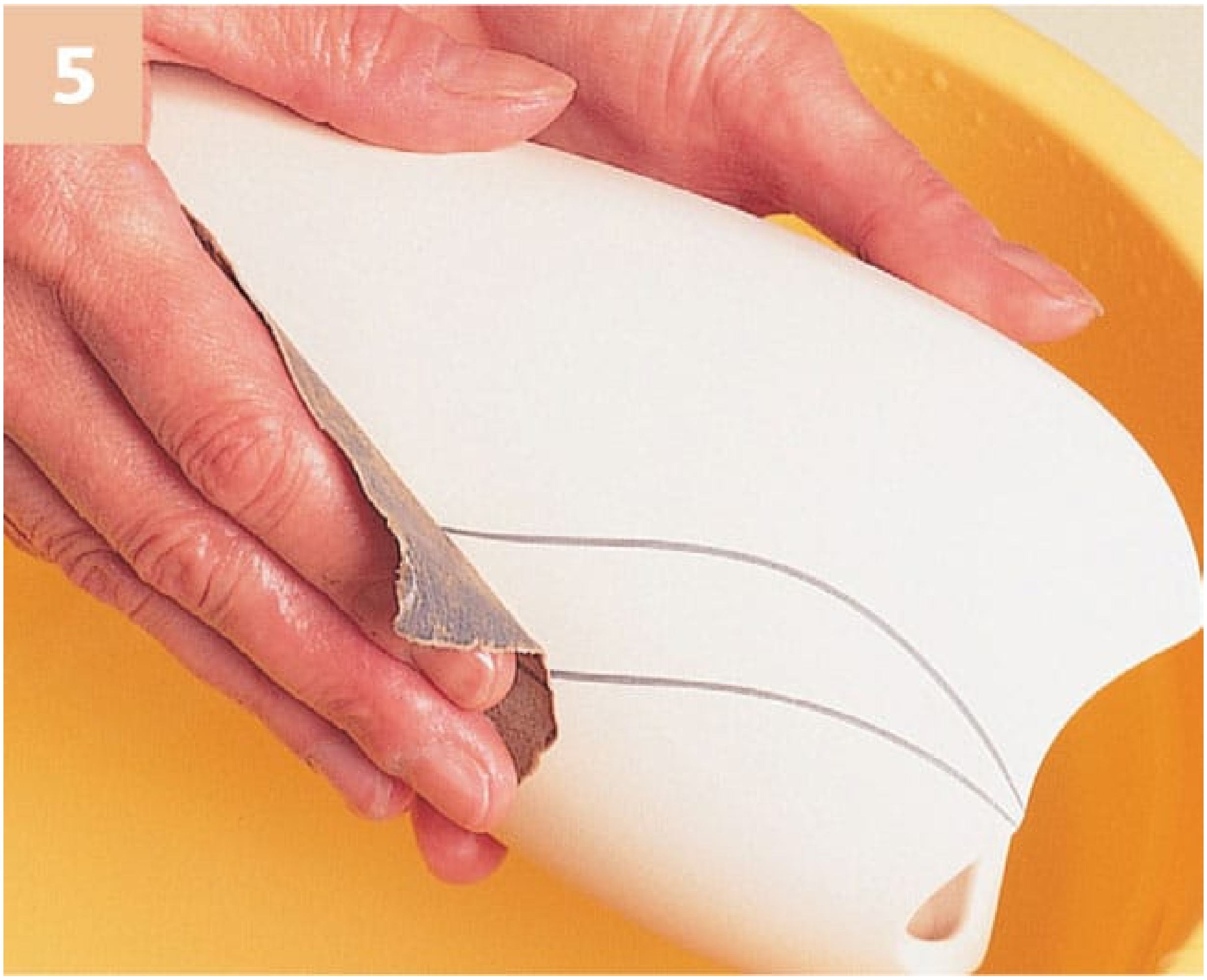


1 Allow the vase to stiffen to a leather-hard consistency, then swiftly incise a flowing line with a knife before widening into a V-shaped groove deep enough to hold the slip. This can take time.

2 Fill the groove with slip until the slip is proud of the surface. Compress it slightly to make sure that the groove is full.

3 Now that the vase and slip have stiffened slightly, the slip can be scraped back with a razor blade to reveal a crisp line that is level with the surface.

4 Continue cleaning up with a sponge, removing all traces of colored slip from the white surface. Even small traces will show up badly when fired.



5 After bisque firing to 1644°F (900°C), rub the work down with the glasspaper while holding it in a bowl of water to avoid dust. This gives a final refinement to the surface. The piece is then ready to be fired again, without glaze, to 2265°F (1240°C).

The finished vase
Two companion pieces have been made, in the same style but different sizes.

Testing inlaid slip

1 To check the final color of inlaid slip, it is useful to make an experimental tile. Press a straight edge such as a ruler into a clay slab to form lines. Fill the grooves with different colored slips.

2 When the slip and the body clay have dried to leather-hard, scrape over the surface with a metal kidney to remove the excess. This reveals the colored lines. The tile can be biscuit fired to the required temperature with or without glaze.

Further Information

Incising and sgraffito, pages 76–77

Slip decoration, pages 100–101

Slips and engobes, pages 154–155

Sprigging

Sprigging is a method of applying small relief clay shapes onto the sides of pottery or into dishes. It involves making molds into which clay is pressed to produce thin but solid clay motifs. Perfected as a technique during the 18th century, it has become synonymous with the work of the Wedgwood company in England, where white sprigs are applied to their blue-stained parian ware.

The original models for sprigs can be made of clay or finely carved from plaster. You can even use real objects from which to make molds. The sprigs can then be produced by pressing small amounts of clay into the molds or by casting with slip. To avoid shrinkage, the clay you use for sprigs should usually be the same as the body clay, though it can be a stained version.

Another method is to use stamped sprigs, which involves impressing small lumps of clay directly onto the surface of the pot with a small plaster or bisque-fired clay stamp. The stamp can be carved with a motif or pattern, which will be transferred into the clay. This method allows you to work with softer clay as well as using a different clay from the body, since the pressure of the stamp usually embeds the motif firmly. A small amount of slip painted onto the pot will also help the sprig to stick, especially if your pots are leather-hard.

1 A fossilized ammonite and a plaster cast of a trilobite are being used here to create sprig molds. The objects are embedded in a block of clay, with the clay sealed around them.

2 A narrow clay wall is formed around each object and firmly sealed to the clay base. The objects are brushed with a good coating of soft soap to prevent them from sticking to the plaster as it dries. A small quantity of plaster is mixed (see page 54) and poured over the objects.

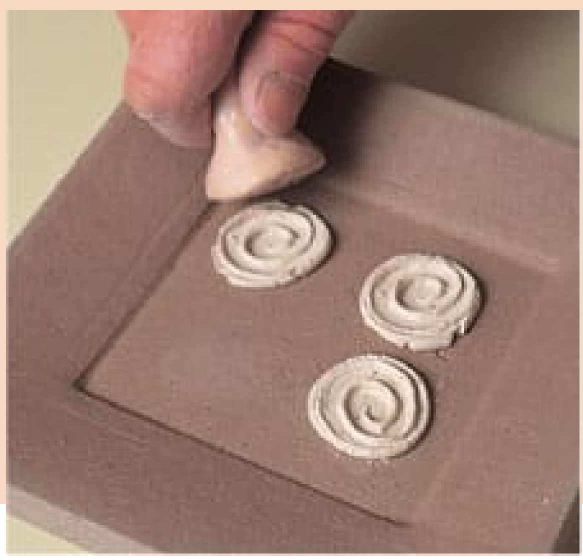
3 When the plaster has set, the clay is removed and the objects pulled out. The molds are left to dry fully, and soft clay is pressed in, with the excess trimmed off with a metal scraper until the clay is level with the top of the mold.

4 The sprig can be removed straight away. Press the flat blade of a knife onto the top of the sprig and draw it cleanly out. Place it to one side and repeat the process until you have enough sprigs for your decoration.

5 To avoid distorting the shape of the work, the sprigged motifs should be attached to the pot when both are leather-hard. Score and slip the edges to be joined, then use a soft brush to clean up the edges of the sprigs and remove any excess slip.

Stamped sprigs

You can apply a whole range of shapes, lumps, and pellets to clay surfaces. All will produce results similar to molded sprigging when pressed with carved stamps. Here, porcelain clay sprigs are being stamped onto a heavily grogged clay body. A small amount of slip has been used to adhere the stamps securely to the body.



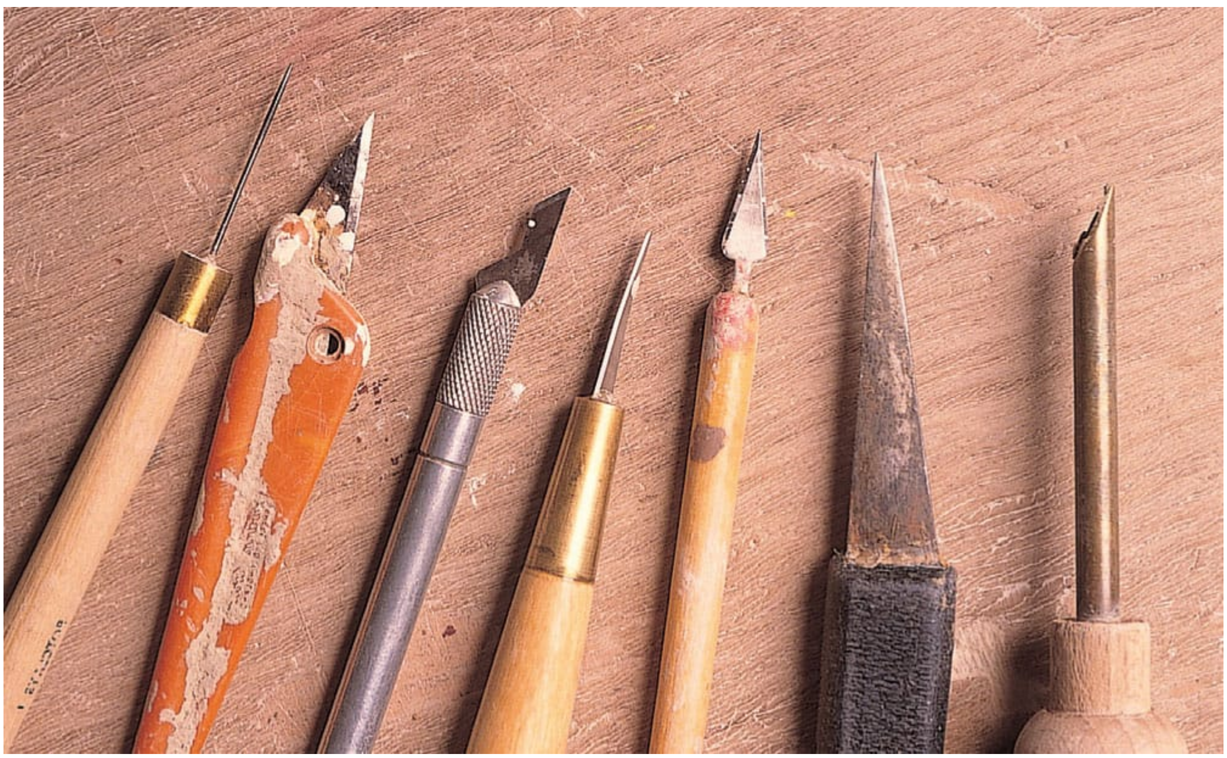
Sprigged teapot
This thrown white earthenware piece by Sarah Monk shows an effective use of sprigged decoration. She selects and applies motifs from a wide array of small plaster molds to add detail and interest to her work, enriching them with applications of honey glaze.

Further Information

Press molding, pages 52–53
Mixing plaster for molds, pages 54–55

Piercing

Piercing means cutting completely through the clay to make a hole, and extreme care is needed to avoid weakening the pot. This demonstration makes the technique look simple, but in fact it calls for skill developed through practice, a steady hand, and an excellent eye for pattern and symmetry—both positive and negative. The clay used here is porcelain, a beautifully smooth body with which to work, allowing the sharp, thin-bladed knife to move freely. The porcelain is very fragile at this leather-hard stage and must be kept damp enough to avoid becoming brittle—though not so soft that it will distort when handled. An even consistency throughout the piece is essential.



Tools
A collection of sharp-bladed tools and hole-boring implements is required for successful pierced decoration.

1 The pot is centered on a banding wheel, and pencilled guidelines are drawn on to it for spacing. The central holes are drilled before the piercing process begins.

2 Working quickly to prevent the clay from becoming brittle (and possibly cracking), the entire design is cut out roughly then refined.

3 When the piercing is complete, the cut edges are sponged to remove burrs, and the pot is left to dry slowly. The work is very fragile at this stage, and if moved, it must be cupped in two hands and picked up from the base.

4

4 The bowl was glazed with white and fired to 2336°F (1280°C). This example was wheel thrown, but many other forming processes lend themselves to pierced decoration.

Piercing and inlay
Two porcelain vases by Louise Darby, pierced and inlaid with black glaze, which is also used on the insides.

Further Information

Porcelain, pages 22–23
Throwing, pages 56–59
Trimming, pages 60–61

Burnishing

The technique of burnishing the surface of pottery as a means of partially sealing it by compressing the clay particles can be traced back to ancient civilizations, but it has gained recent popularity throughout the USA and Europe as a decorative technique. Burnishing involves no more than rubbing the clay surface with a smooth tool to produce a mirror-smooth surface. It is done when the clay surface is leather-hard or dry. Most clays are suitable for burnishing, although the finer the clay, the smoother the burnished surface.

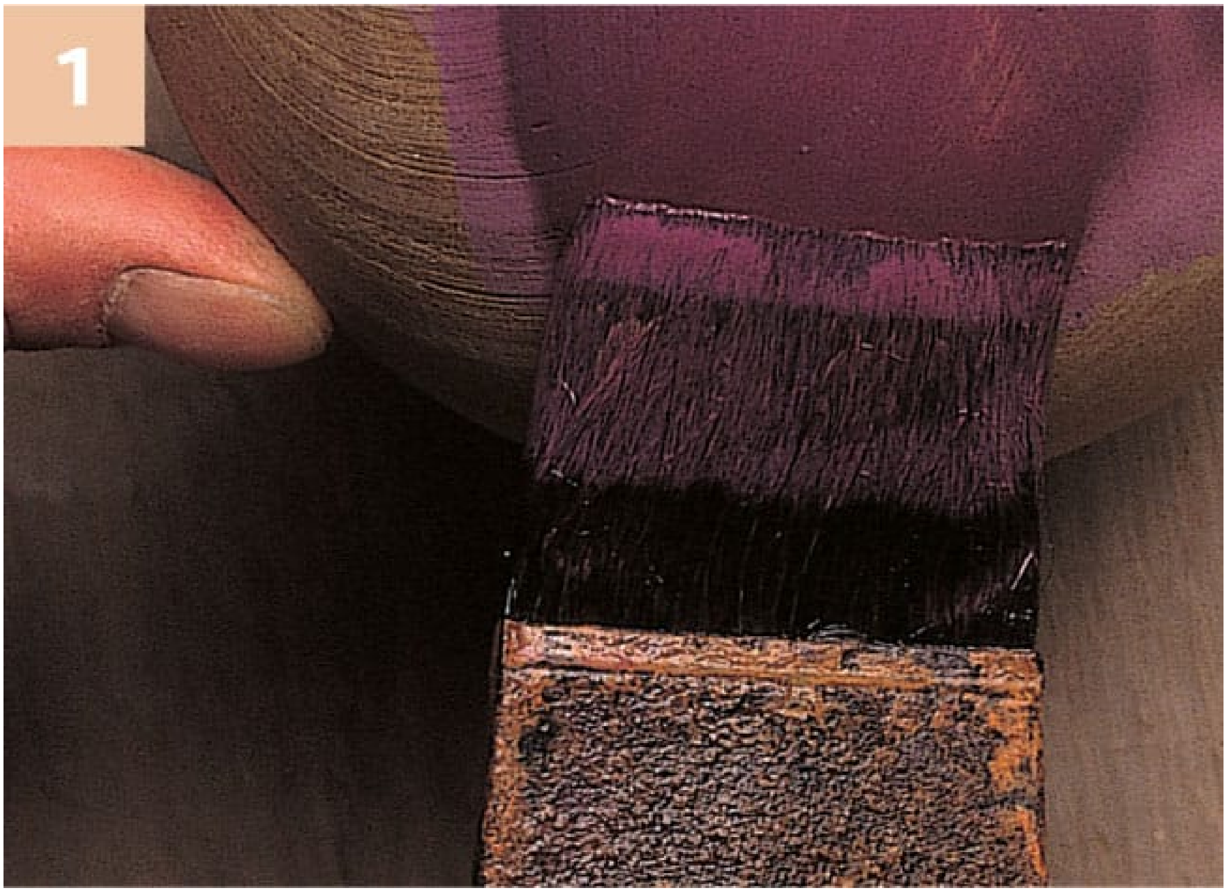
Although it is perhaps easiest to burnish when the pot reaches leather-hard state, the shiny surface will often sink as the pot dries out completely. A dry pot with a fine spray of water over the surface will produce a more durable gloss, while even better results are produced by coating the surface of the dry pot with a thin slip, which will adhere to the surface without flaking off as it dries. Burnishing dry pots is likely to produce more breakages as during this dry state the pot is at its most brittle and vulnerable.

Burnishing tools
A variety of objects can form useful burnishing tools, and potters soon develop their own favorites. These could include such unlikely items as pieces of bubble packing material and dentist's tools as well as the more obvious spoons, pebbles, and knife handles.

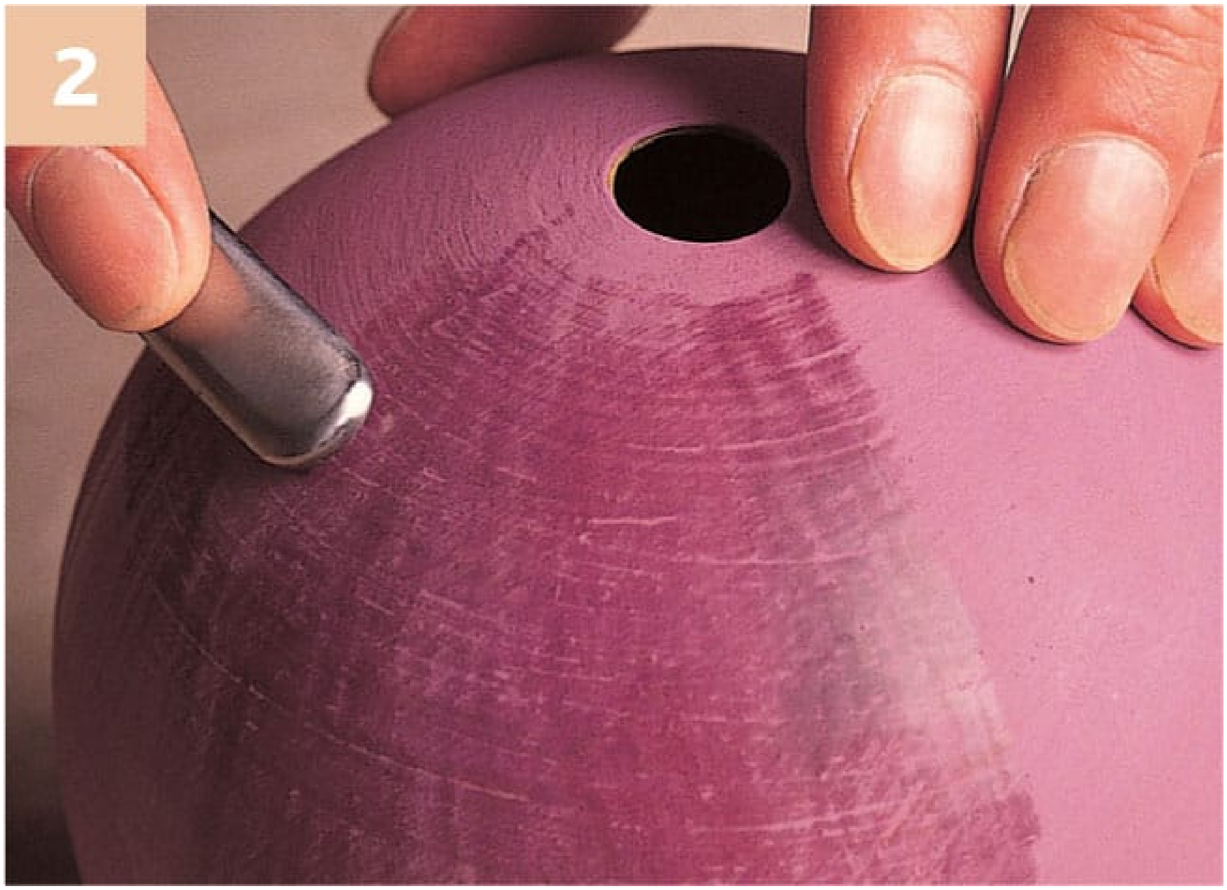
Using a spoon
Here the convex surface of a spoon is used in small circular movements for the outside surface. The same method can be employed for the insides of open bowl shapes.

Using a knife handle
A knife handle used vertically on a surface of an uncomplicated shape can burnish large areas effectively and quickly.

Burnishing dry pots



1 Dry pots can either be lightly sprayed with water and then burnished immediately afterward, or the dry surface can be covered with a suitable colored slip before burnishing.



2 Burnishing dry rather than leather-hard surfaces produces a high gloss which is less likely to dull afterward.

3 After bisque firing, burnished pots can be lightly waxed. This helps to seal the surfaces as well as deepening the gloss.

Exploiting form
The work of Magdalene Odundo forges a link between the simple traditional hand-forming and burnishing techniques often employed on African utilitarian ware and the more sophisticated approach of Western potters, some of whose work exploits pure form rather than function. In this case the form is wonderfully enhanced by burnishing.

Further Information

Pouring and dipping slip, pages 104–105

Slips and engobes, pages 154–155

Agateware

Agateware is the name given to pieces of work using a combination of contrasting colored clays as the integral structure. This technique offers the potter considerable scope since it permits both the creation of free, quick and random effects, as when used in throwing, or enables extremely precise and carefully thought-out patterns and designs to be developed by hand-building construction methods.

The best results are obtained by using white or very light-colored clay and adding colors in the form of stains or oxides. In order to disperse the color evenly throughout the clays it is advisable to add the colorant to the clay while both are in powder form. The percentage of colorant required is a matter of personal taste, but as a very rough guide tests should be carried out using anything from 1–10 percent of colorant. The exception is the blues, which seldom require more than 2 percent for strong coloring. The increased popularity of the agateware technique in recent years has been recognized by pottery suppliers, who now offer prepared colored clays specifically for this purpose.

When agateware pieces are produced by joining strips or sections of colored clays, there is a danger of cracking along the many joints also the drying process should take place gradually, over a period of weeks rather than days. Work can be kept in plastic bags or containers in order to slow down drying once the piece is completed.

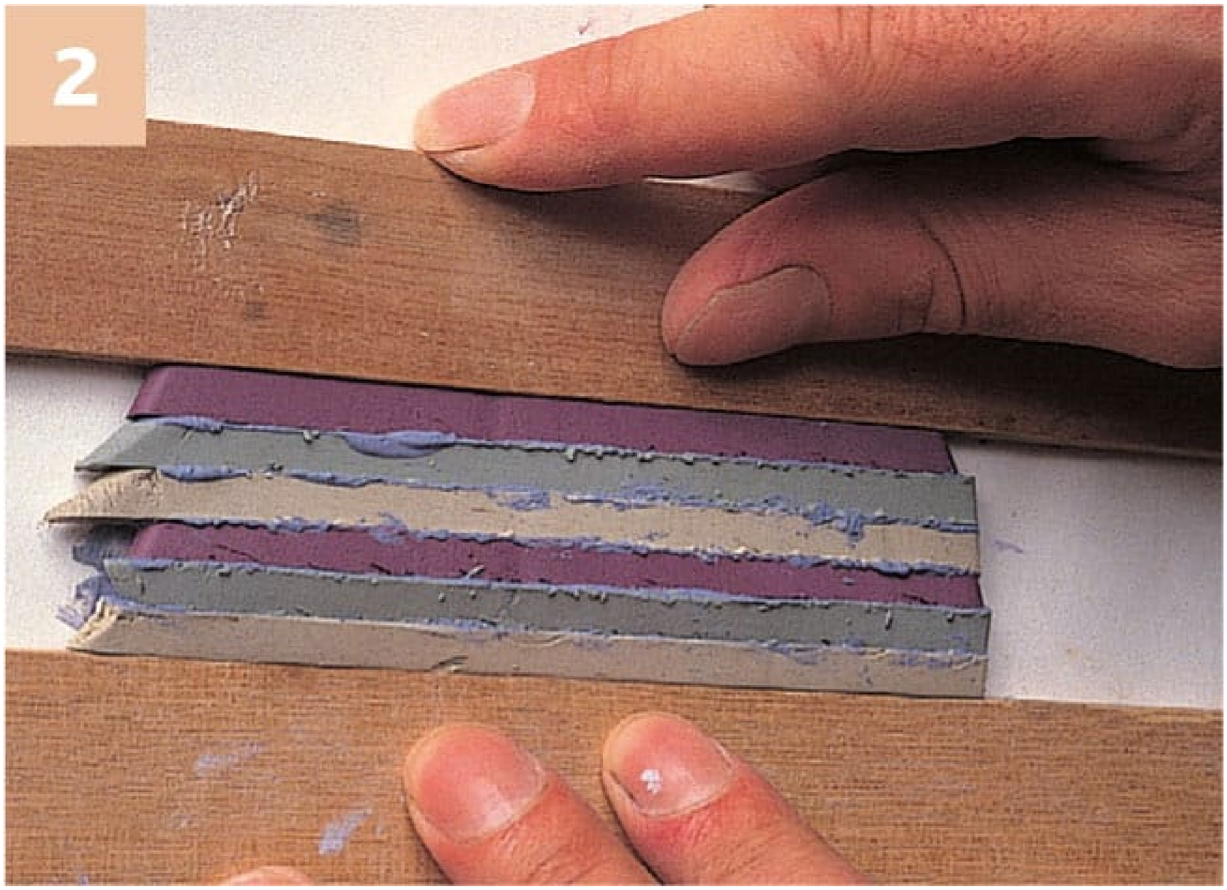
Mixing clays

1 Two or more clays of different colors can be combined for throwing by the techniques of kneading and wedging (see pages 34–35). Clays to be used in this way should be well prepared separately beforehand, as prolonged wedging and kneading of different colors will blend them all together.

2 Slicing through the block of clays will reveal the extent to which they have blended together. Strong agate patterning is usually the result of a smaller ratio of the stronger color.

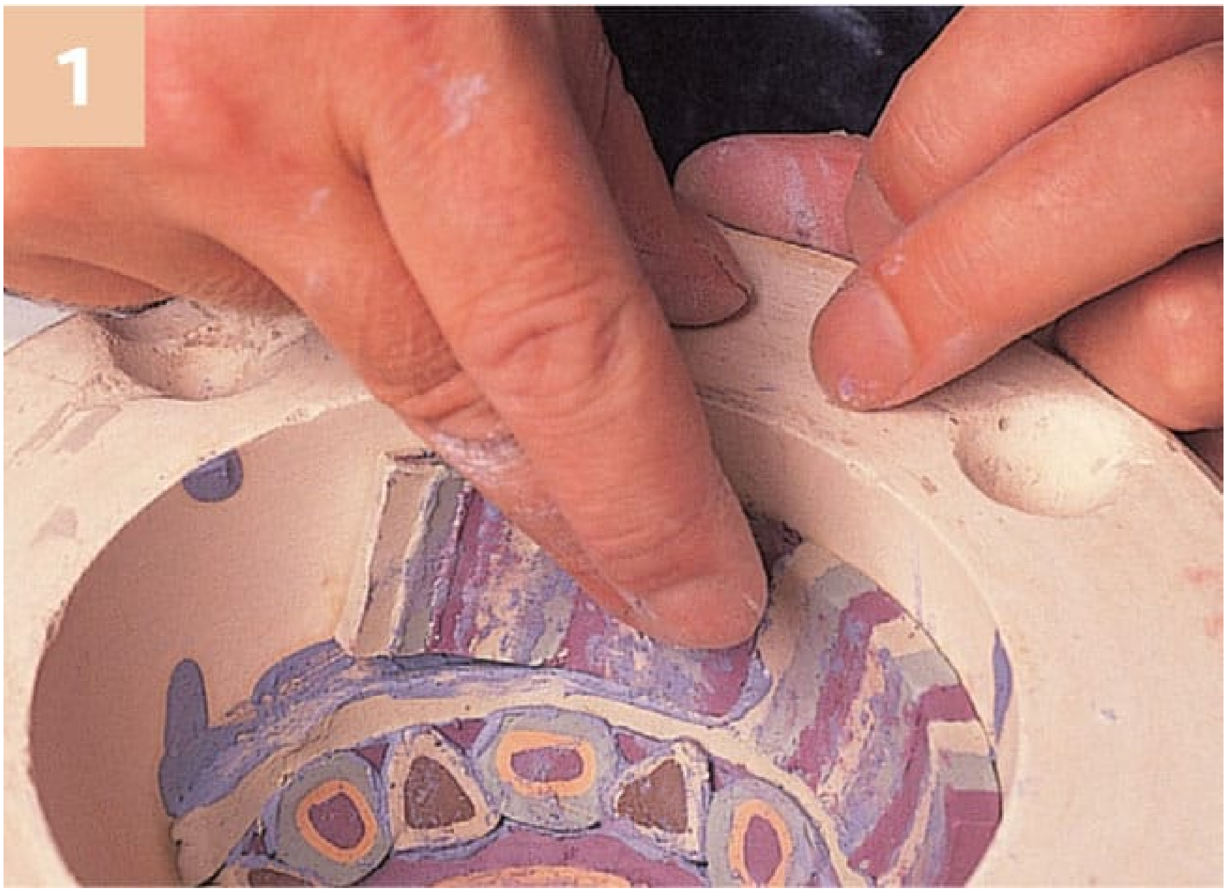
Using strips of clay

1 Strips can be joined to form slabs of patterned clay. Guides will ensure an even thickness and the blade used to cut the strips must be sharp or the clay may tear.

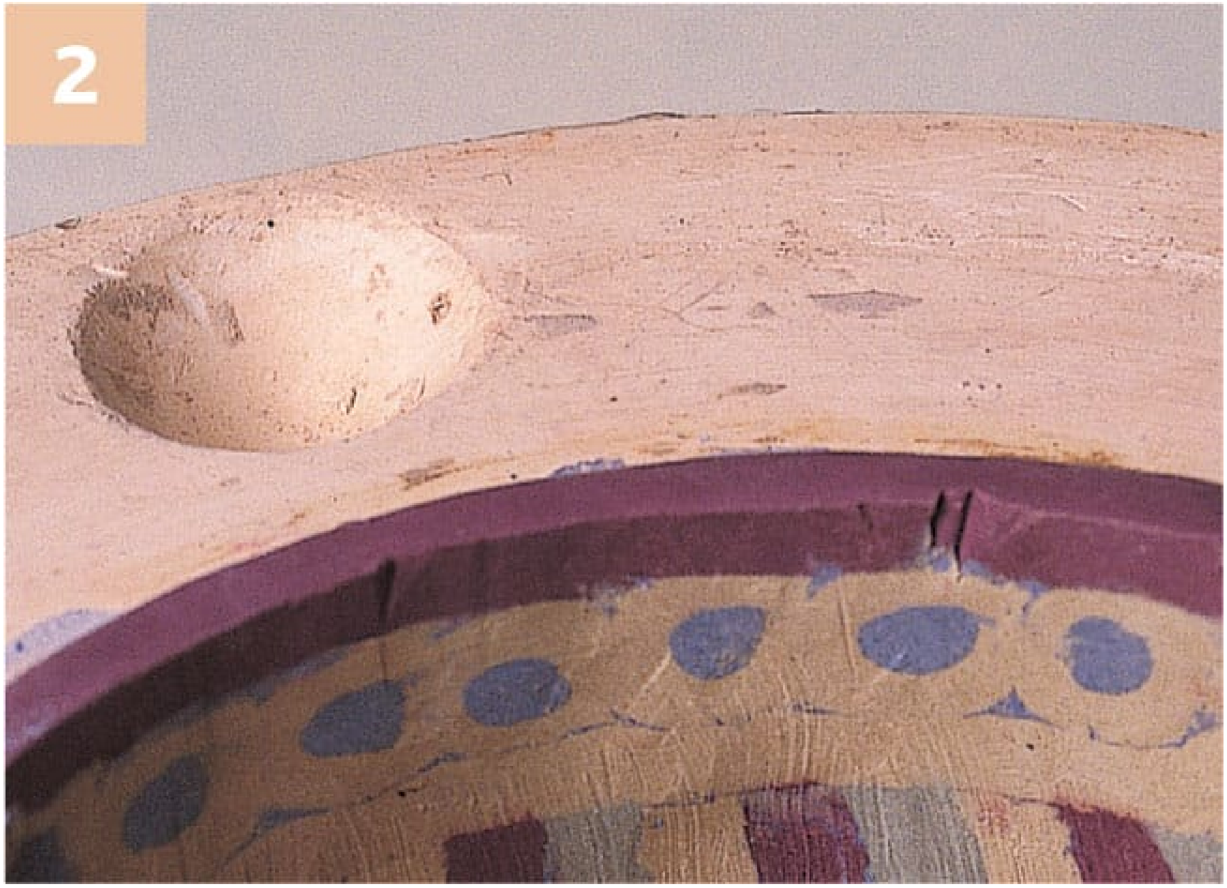


2 Colored slip is applied thickly to the scored surface before a further strip is added. The colored slip will be visible as a thin, delicate line after the final scraping. The growing slab of agate clay is gently squeezed between wooden slats to secure the joints.

Press-molded agateware



1 Agate pieces can be formed inside a mold. The shape is built up by scoring each individual section and pressing it into place.



2 The work should be dried extremely slowly to give all the separate pieces time to join properly. It should not be removed from the former until stiff enough to handle without fear of damage or distortion.

3 When at least leather-hard it can be removed, though the inside can be cleaned up by scraping beforehand. A flexible metal tool can be useful, but sandpaper or steel wool are more suitable if the work has dried beyond leather-hard.

FURTHER INFORMATION

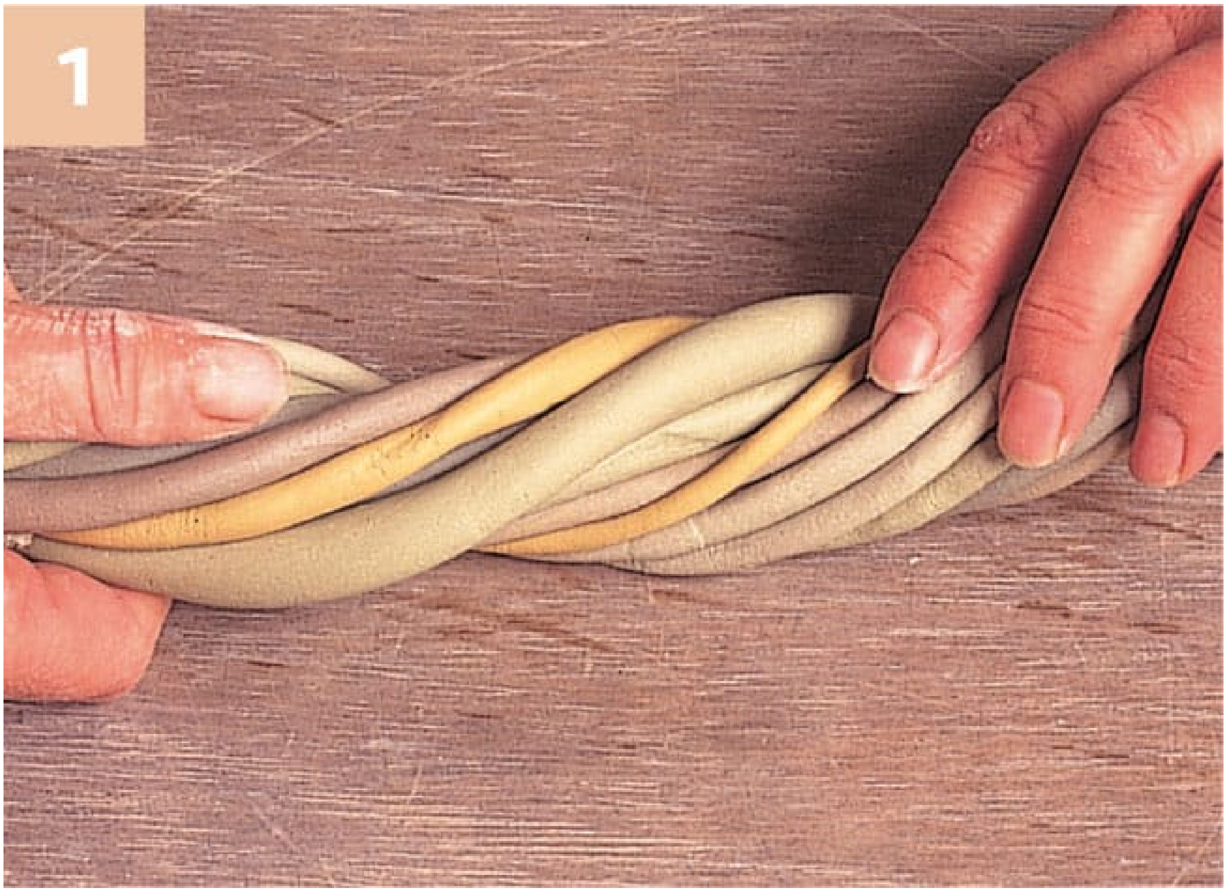
Colored clay, pages 26–27
Preparing clay, pages 34–35
Press-molding, pages 52–53

Hand-built agate leaf form

There are many different ways of hand building with colored clays. Here, the method used is that of rolling and stretching the clays to give an effect reminiscent of rock strata. The clays are manipulated in such a way as to stretch into subtly layered stripes. The thin sheet of clay is laminated onto a backing slab so that it can be used to build with.

YOU WILL NEED:

- Different colored stoneware clays
- Rolling pin
- Canvas to roll on
- Knife
- Plaster molds



1 Roll a variety of thin and fat coils from batches of different colored clays. Twist the coils together—the tighter the twist, the finer the stripes will be.

2 Flatten the coils with a rolling pin to form a thin striped slab. Only roll in one direction at this stage to keep the width of the colored lines even.

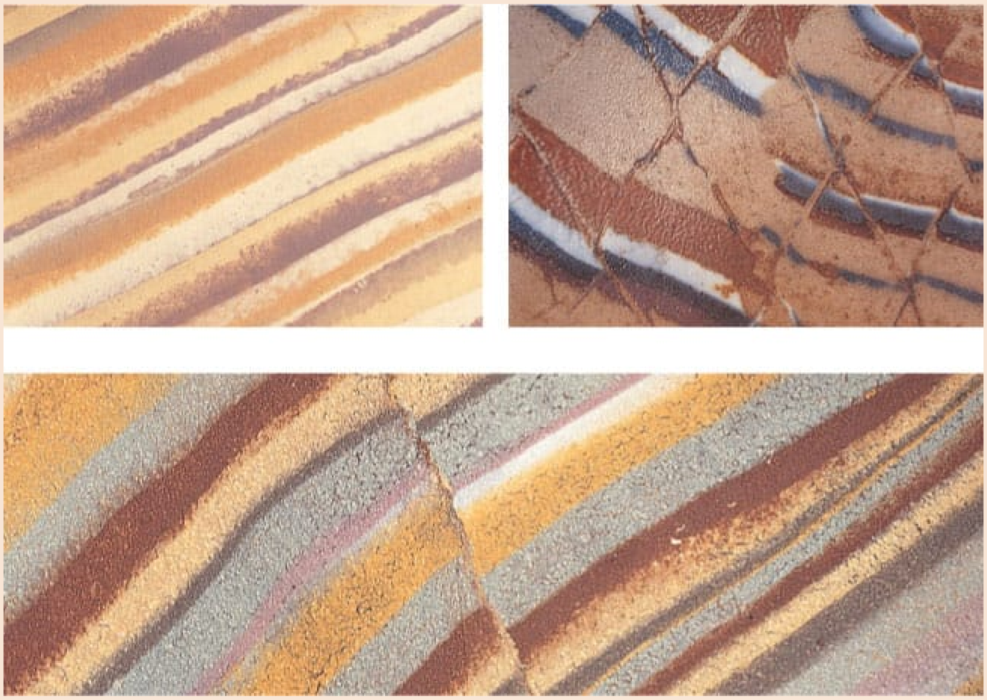
3 Cut the slab and rearrange the halves to introduce a fault line in the pattern. Roll the pieces again so that they become joined together.

4 Place the rejoined halves on a slab of the same clay, and roll again to laminate them to the backing slab. Continue rolling to achieve the required effect. Eventually the colors stretch and some become almost translucent, revealing other colors beneath.

The finished piece

The double-walled, leaf-shaped bowl, 18 inches (45 cm) long, in unglazed stoneware, was press-molded in two halves (see page 52) and joined at the leather-hard stage.

Further ideas



These pieces show different combinations of colors and patterns put together in the same way. The top right one is salt-glazed, using terracotta and porcelain clays as well as cobalt and iron stains. The other two pieces are unglazed stoneware, given an electric firing at 2282°F (1250°C).

For this agateware bowl by Mal Magson, colored clay was rolled and folded, then chopped into pieces and assembled on a flat surface. It was then rolled until joined completely and the slab was pressed into a plaster mold. When dry it was rubbed with wire wool to reveal a crisper surface and fired to 2300°F (1260°C).

Details of two press-molded plates by Jo Connell, made by placing tiny rolls of pale-colored clays on a colored background and then rolling them into the surface. Cobalt oxide was used to stain the background in the first example, and copper oxide was used on the second.

FURTHER INFORMATION

Colored clay, pages 26–27
Press molding, pages 52–53
Agateware, pages 90–91

Surface texture

The illustrations on these pages show a variety of surface textures, in some cases combined with colored glazes and slips. Professional potters usually have a clear idea of how they will decorate their pots from the outset, as it is essential that the type of decoration fits the form.

DECORATIVE WHEEL MARKS

One of the most direct forms of decoration is to retain the “throwing lines” that occur when the pot is gradually pulled up rather than smoothing them down. In this piece by Morgen Hall the ridges are accentuated by the thin white glaze, which allows the orange of the terracotta clay to show through.

COMBING

This piece by Peter Cosentino was decorated using a version of the incising method. A section of saw blade was combed across the pot's surface in both vertical and horizontal directions when the clay was leather-hard. The textural effect was emphasized by rubbing in manganese, and white slip was then brushed over the raised surface.

BURNISHED SCULPTURE

The method of coil building lends itself well to sculptural forms like these two figures by Lorraine Richardson, and burnishing and polishing bring out the shapes very strongly.

INCISED PORCELAIN

This double teapot by Caroline Whyman was thrown in porcelain and inlaid with darkly stained slip made from the same body when bone-dry.

Enhanced forms

As on the previous pages, these images show how the decorations enhance the forms rather than being added on for the sake of it. The burnishing on the coil-built vase makes it catch the light to accentuate the form, while on both the stoneware and porcelain vases the motifs have been given a vertical emphasis in keeping with the shapes.

INLAID MOTIFS

The effective surface decoration of this elliptical stoneware vase by Jo Connell was achieved by inlaying decorative motifs made from a range of pastel-colored clays.

INLAY ON COLORED CLAY

Sue Dyers's elegant vase, titled "Life Spiral Female Form," was made of blue-stained porcelain thrown on the wheel and inlaid with two different colored slips.

AGATEWARE

These two deep press-molded bowls by Judith Wooton illustrate the precise control of patterning it is possible to achieve by this combination of forming and the use of colored clays.

STENCILING AND BURNISHING

This large vase by Jacqui Atkin was coil built, covered with a deep red slip when semi-dry, and then decorated with simple stenciled designs. It was burnished when leather-hard and wax-polished after firing to give it a deep, lustrous sheen that complements the shape and the warmth of the colored slips.

CHAPTER 4

PAINTING AND PRINTING

This chapter will really inspire you, whether you want to employ traditional methods such as slip trailing, which have been used for centuries, or discover your own methods. And don’t forget that any of the techniques shown on the following pages can be combined with those you have learned earlier, thus expanding your decorative repertoire.

Slip decoration

Slip has been used as a means of coloring and decorating ceramics for centuries. As soon as potters discovered clays of different colors, it was found that when mixed with water the clay made a useful coating for the surface of a pot. Slip is simply a mixture of clay, water, and sometimes a pigment, such as an oxide or stain.

When slip is mixed to a thick consistency it is possible to change the surface color of a pot with one application. In this way, it provides a solid-colored background for paint or glaze, and is an inexpensive way of making a common dark clay appear white. Thinner slip gives interesting effects, allowing the base clay to show through, and different layers of color and texture can be built up. Possibilities for decoration at this early leather-hard stage are enormously varied, as slips can be applied in many different ways with a variety of implements. Many potters choose to decorate exclusively with slip. Some use a limited palette associated with traditional country pottery: white, cream, brown, black, and occasionally greens and blues—covered perhaps with a clear or honey-colored transparent glaze. Domestic ware of this kind has been widely used over the centuries, and its warmth and familiarity have a particular appeal. Other potters may choose a more contemporary palette, making use of the range of vivid stains now available, or they may use subtle pastel colors to give ethereal effects. Slip colors are richer and brighter when coated with a clear glaze, but at higher temperatures slip can be left without glaze if a matte surface is preferred (see pages 154–155 for more about slips and colorants).

Implements for slip decoration
A wide variety of tools can be used for applying slip, including sponges, slip trailers, and brushes.

Mixing colored slip

1 To make a colored slip from scratch, add the powdered clay and colorant to the water and mix thoroughly. If you already have a base slip you wish to color, it is best to premix the colorant with water to break down any lumps and disperse the color evenly. Use a stiff-bristled brush to push the mixture through a 100–120 mesh sieve, then pour it into the base slip and mix well.

2 Stir the mixture through a 200-mesh sieve. This prevents small particles of stain from speckling the slip when painting or during firing. The next day, remove any excess water from the top of the slip if desired.

Combined methods

Detail of a hand-thrown bowl by Ralph Jandrall, decorated with an oak leaf design created using sponging, glazing, sgraffito, dipping, and detailed brushwork.

Further Information

Slip trailing, pages 106–107

Feathering and marbling, pages 108–109

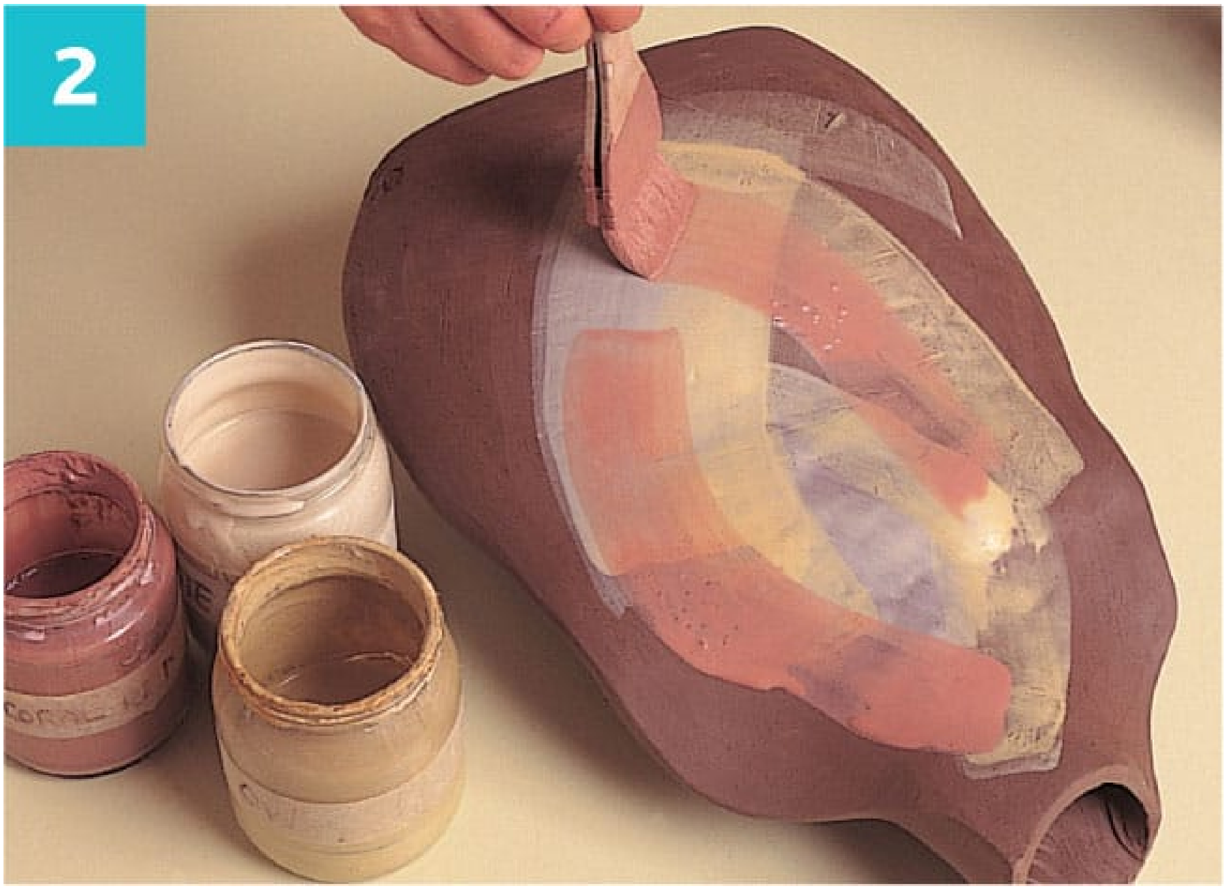
Slip decoration with sgraffito

Although slip decoration is often used on its own, it can be combined with other techniques, and the slip can be used in varying thicknesses to create different effects. Here a simple coil-built piece made from terracotta clay is decorated at the leather-hard stage. Colored slips, brushstrokes, and sgraffito methods are effectively combined.

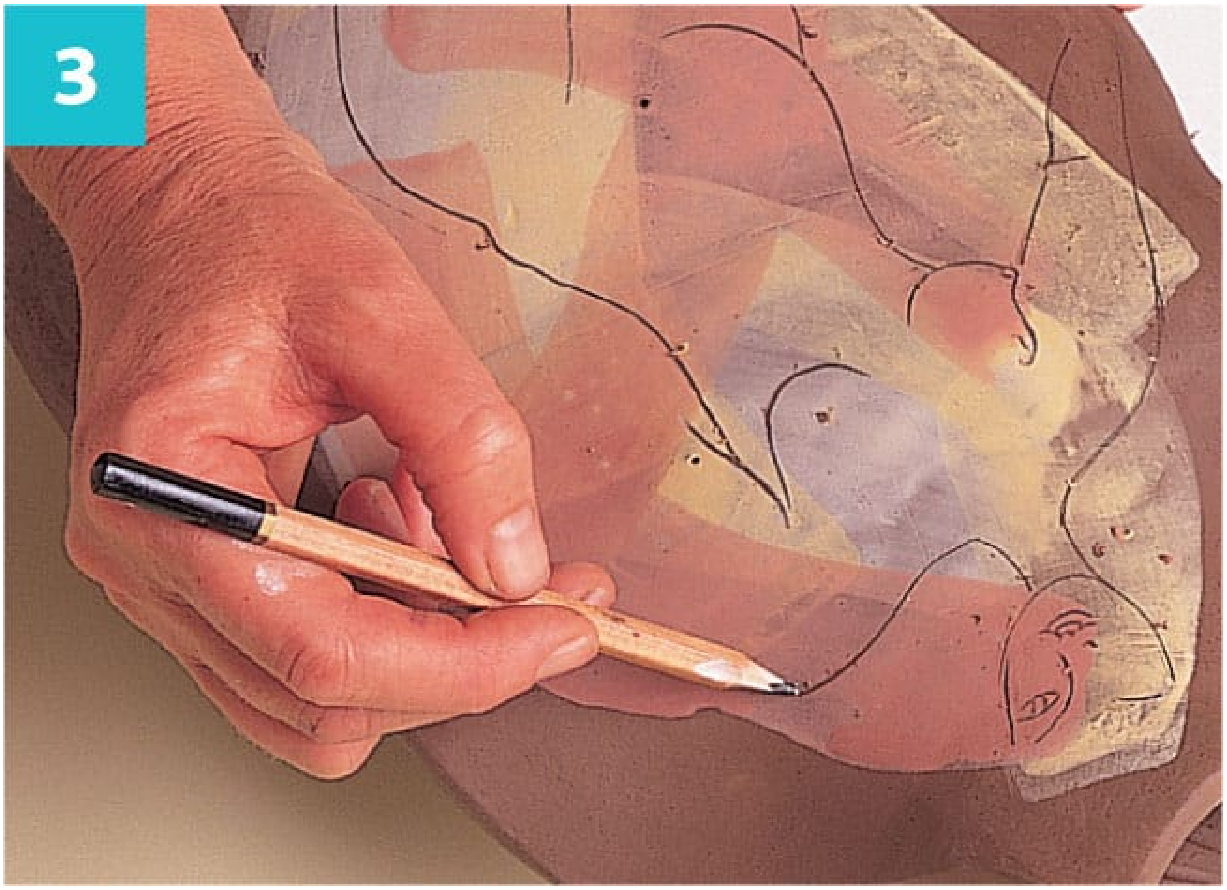
YOU WILL NEED:

- A selection of tools for incising and sgraffito
- Brushes, various
- Colored slips
- Leather-hard piece for decoration

1 Apply a thin coating of colored slip with a broad, soft brush.



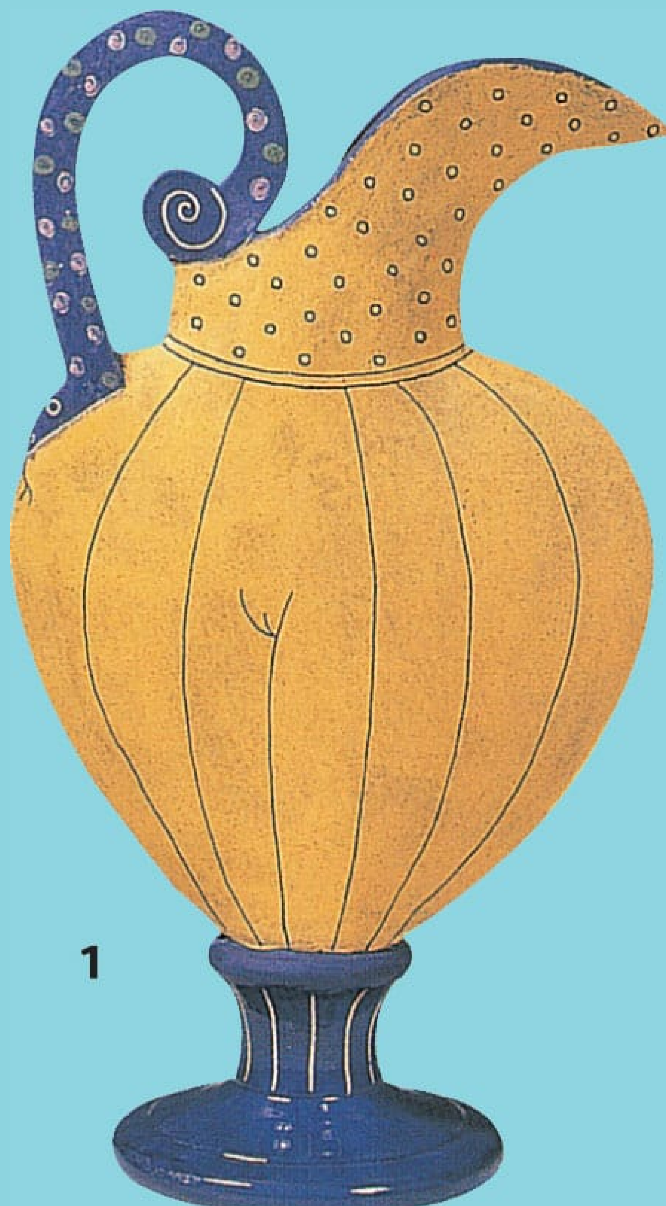
2 Gradually build up layers of color, using the slip relatively thin. Each color will look very different at this stage, but firing will even them out so that they give a shaded effect.



3 A pencil is used to sgraffito a line drawing through the slips. Keep the drawing fairly simple or the effect will become fussy.

The finished piece
After firing you can see the subtlety of color. The background slip was scraped away to emphasize the outline of the figure, and the piece was fired to 2012°F(1100°C) and polished with beeswax.

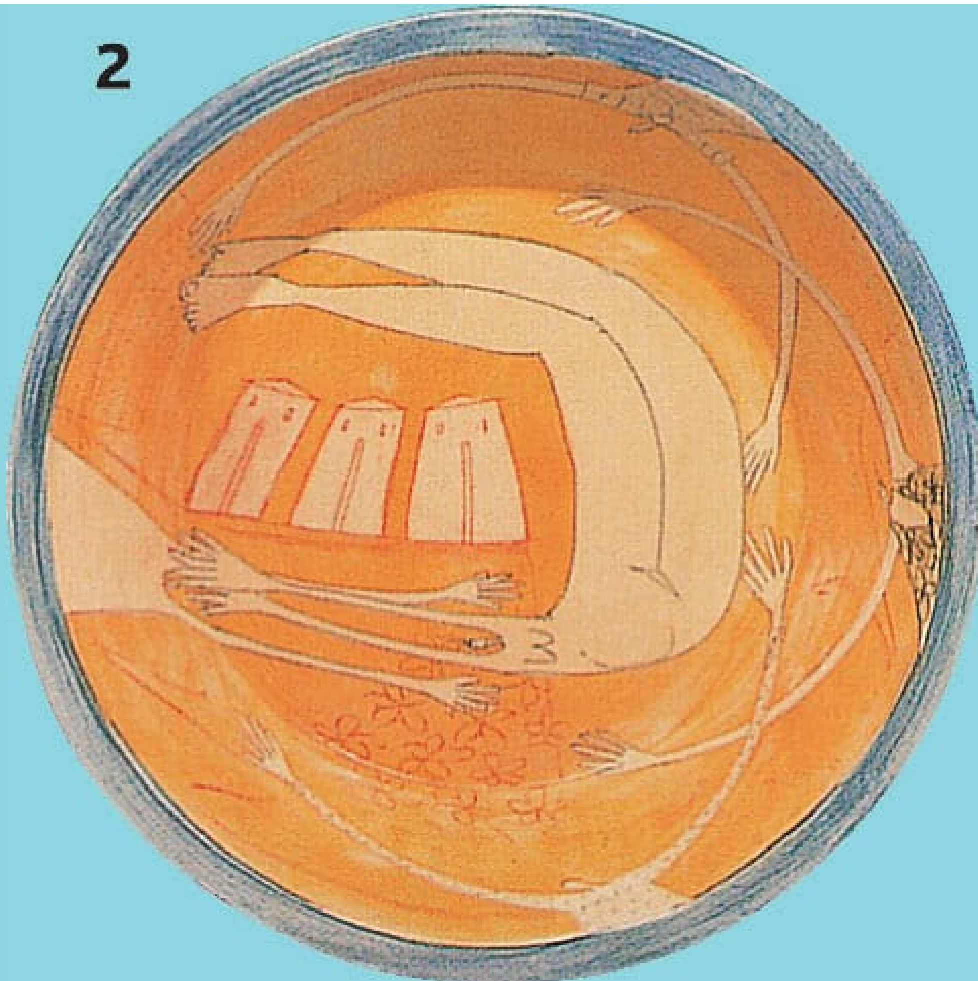
Further ideas



1

Jude Jelfs's jug (1) is slab-built earthenware decorated with vitreous slips and glazed inside.

2



Earthenware bowl by Vivienne Ross (**2**) with colored slips and sgraffito.

Bowl by Jean Paul Landreau (**3**), decorated with slip resist and sgraffito.

FURTHER INFORMATION

Coiling, pages 42–43
Incising and sgraffito, pages 76–77
Painting with slip, pages 110–111

Pouring and dipping slip

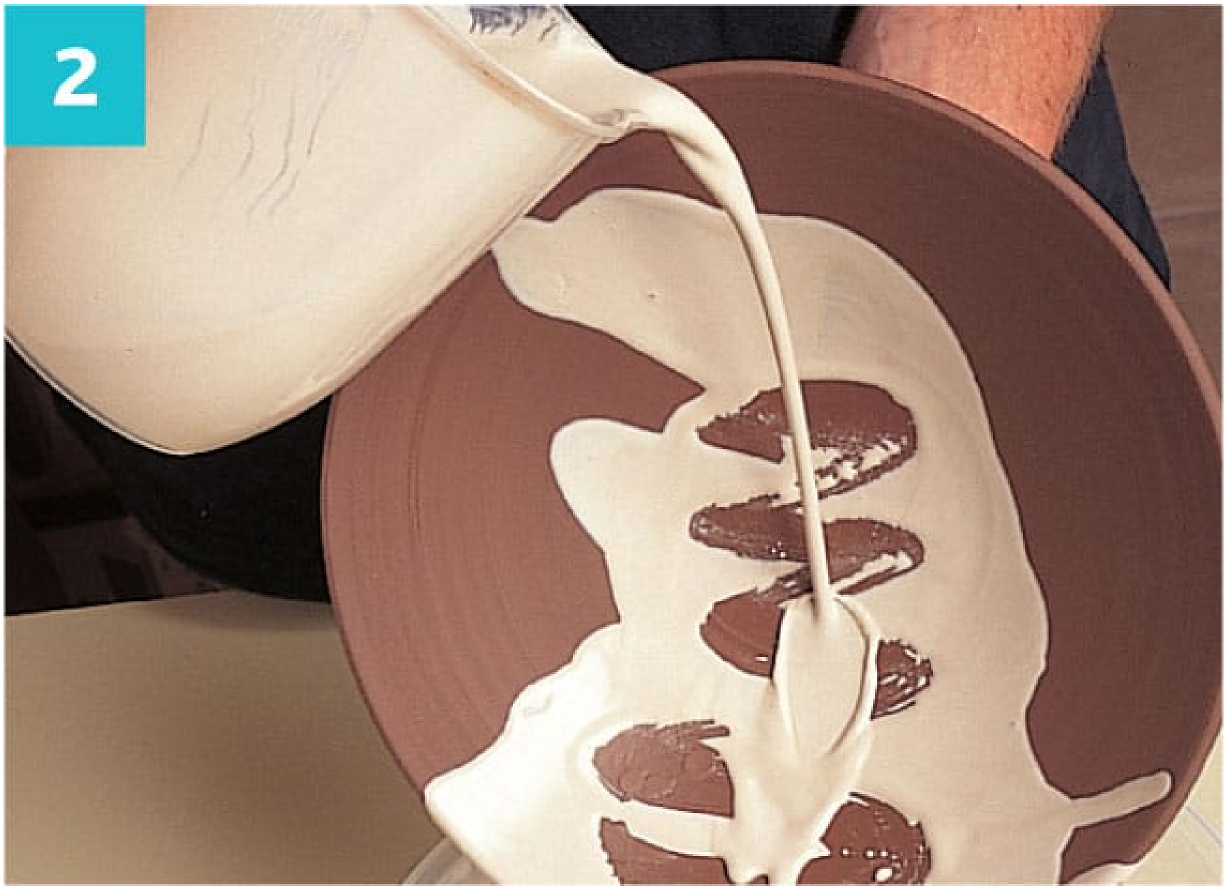
Pouring is a simple and effective way of applying slip, and enhances the forms it coats. The object is held firmly over a bucket while a pitcher of slip is poured over it. The pouring action makes a natural “curtain” of slip, resulting in a fluid curve that complements a rounded form.

The pot must be held confidently in one hand for a few minutes while the other hand does the pouring, and excess slip is allowed to drain off. It will be much easier if there is a substantial foot ring to hold at the base of the pot. Some forms, such as a round-based spherical bottle, would be impossible to grip but could be stood as slip is poured on.

Dipping is another useful way of applying a dense and even coating of slip. The form must lend itself to easy handling. A thrown pot can be more easily held if it remains attached to a throwing bat and is wired off later. Always make sure that the bucket is wide enough and that there is sufficient depth of slip. The pot must not be allowed to touch the bottom or sides. Finger-marks are best rectified immediately while the slip is still fluid enough to heal over the marks. The pot can be dipped to cover the whole surface, but in this example, dipping is used for decorative effect, and the dip lines follow the form of the piece.

Pouring slip

1 Wax-resist brushwork (see page 116) using hot wax is applied to a red clay bowl.



2 White slip is gently poured over the bowl, which is held at an angle to prevent the slip pooling in the center.

3 The slip is shaken from side to side to encourage decorative runs. A bowl beneath catches the excess slip as it runs off.

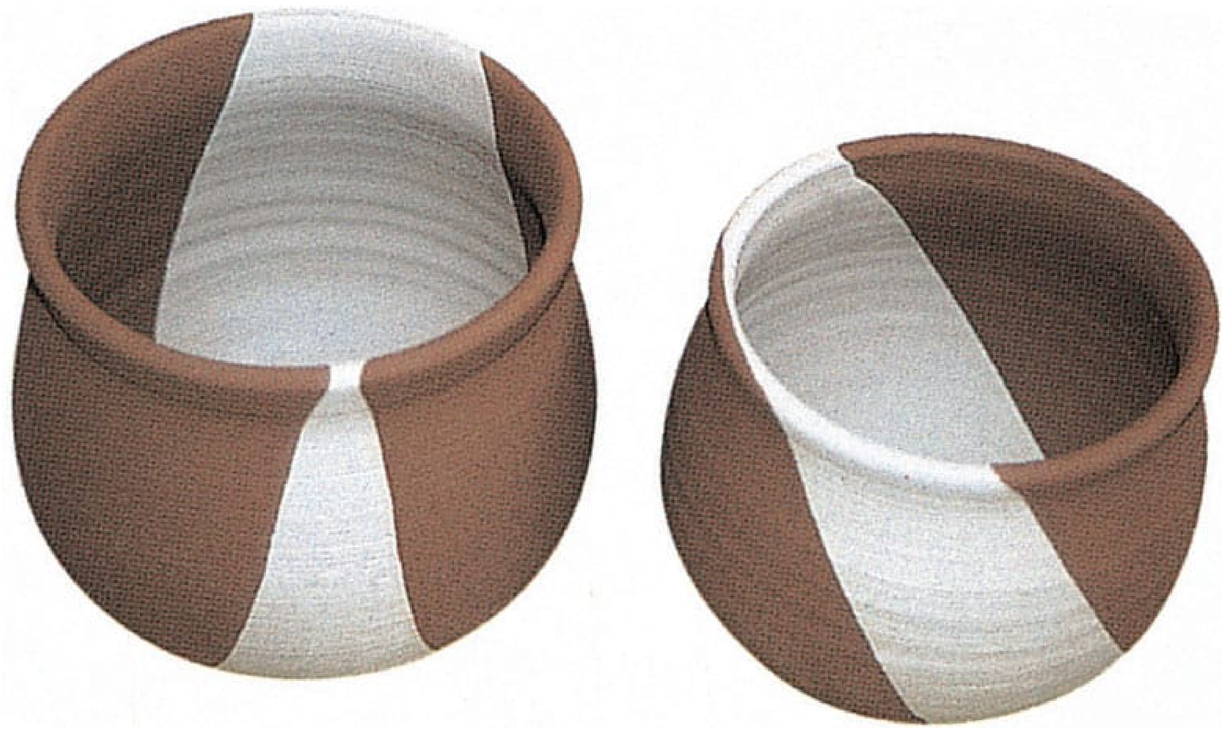
Dipping slip

1 The vase is first dipped sideways to apply a blob of slip on the side. The piece must be lifted out carefully to avoid it touching the sides of the bowl.

2 The vase is dipped again on the side and then on the neck, and is then stood up carefully to avoid runs developing.

Using wax resist

An alternative method of dipping is shown here: a cylinder that has been brushed with wax resist (see page 116) is dipped into slip.



Clean lines
Dipped pots, unfired. Dramatic effects can be achieved by dipping, but care and practice are needed to get clean lines.

Further Information

Inlaying slip, page 81
Painting with slip, pages 110–111
Using resists, pages 116–117

Slip trailing

Slip trailing is usually done with a rubber tool in the form of a bulb with a detachable nozzle, though many types of slip trailer exist. It is possible to improvise with plastic bottles and so on, but a customized tool, as used in this demonstration, can provide greater control.

Slip for trailing should be fairly thick in consistency and well sieved. The lines should appear free and fluent, so it is advisable to practice first. This can be done on a sheet of plastic, without wasting the slip. Load the trailer as fully as possible, shaking the slip down into the nozzle to avoid any airlocks that would spoil the flow of the lines. Squeeze evenly and steadily to produce a continuous flow of the lines. You will soon discover that your slip trailer is as deft a drawing tool as a pencil or brush.

Trailing on a background of leather-hard clay or a relatively dry undercoat of slip results in raised lines. Other slips can be used later to fill the gaps, or after bisque firing the areas between the lines can be filled with colored glazes. This process, called tube lining, is usually done on bisque-fired ware. It is a means of defining decorative areas, which are then filled with color. Slip made from the same clay as the pot is trailed to outline decorative areas, and after bisque firing the trailed lines—although identical in color to the rest of the surface—will be slightly raised. The areas defined by the raised lines are then colored with oxides or other underglaze pigments (see page 118). A transparent glaze is applied over the top of the color, or alternately the pot can be glazed first and have the color applied over it before glaze firing as in the majolica technique (see page 134). Tube lining was a popular form of decoration on Victorian tiles, and Britain's Moorcroft Pottery has made it a speciality.

1 The leather-hard bowl is centered on a banding wheel, and lines of slip are trailed on while the wheel is moving.

2 The bowl could be marked out lightly in pencil to give guidance, but here the slip trailing is done by eye—the result of a great deal of practice.

3 The pattern is built up using fluid lines and with a sure and steady hand. Here, only black slip is being used, though of course any color combination is possible.

4 The pattern is repeated on the inside, with the spacing planned in advance to ensure that it is all the way around.

5 Many potters feel that if their work is being handled, the inside and outside are of equal importance. Decorating all facets of the bowl, including the inside of the foot ring, make it a truly three-dimensional piece and a pleasure to handle.

6

6 The bowl was bisque fired and some of the defined areas filled in with colored glazes before being fired again to earthenware temperature 2008°F (1100°C).

Further Information

Feathering and marbling, pages 108–109
Painting with slip, pages 110–111

Feathering and marbling

The delicate effect known as feathering is named after the pattern it produces— and a feather is traditionally used for dragging the slip. A steady hand and good control of the slip trailer is needed for this method, so you may need to practice first. Feathering can be done with slips of any color, but here we chose traditional black (which appears brown until fired), with white lines and a honey glaze.

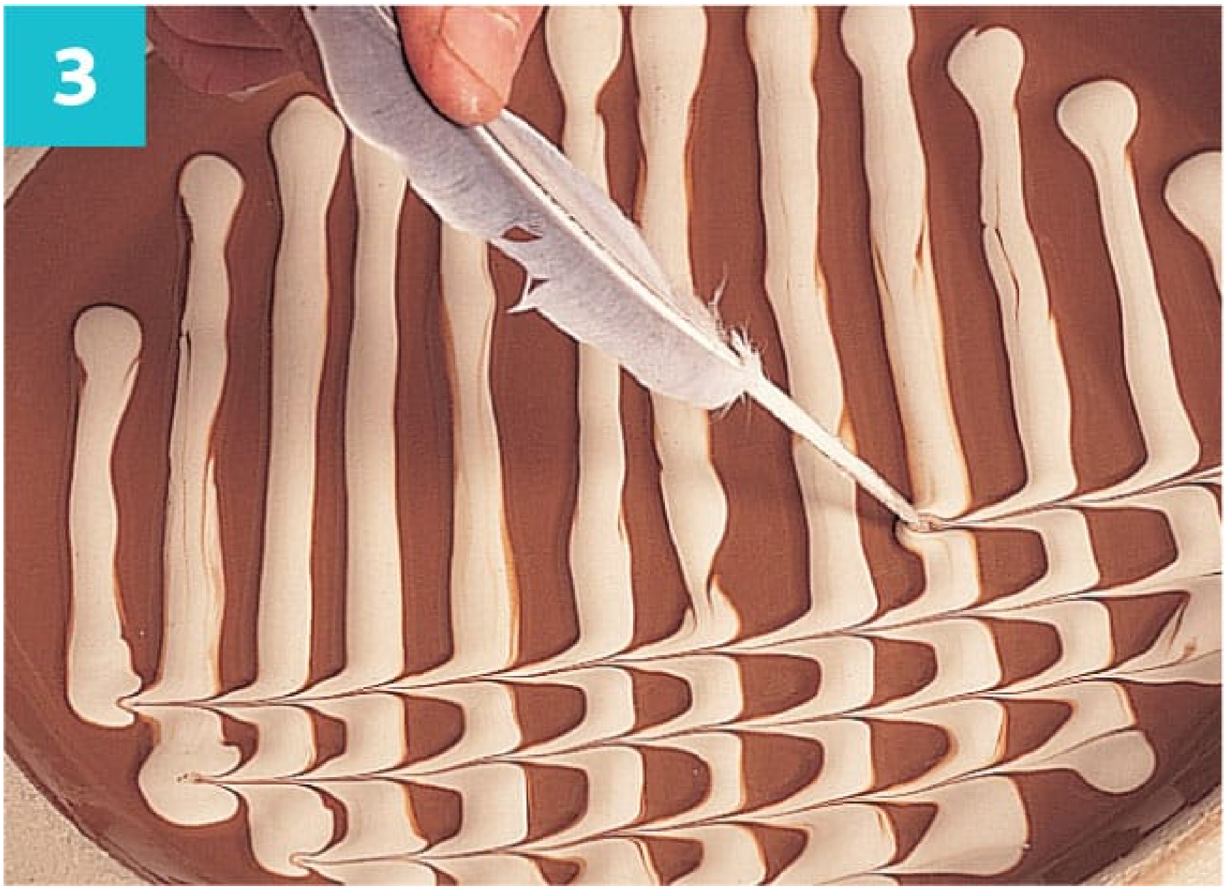
Feathering is considerably more difficult to achieve on a three-dimensional piece than on a flat surface, but it can be done.

Marbling is a technique with its roots in traditional country pottery. The first step is to apply a coat of slip to a leather-hard pot—usually a dish or other simple form. Throughout the decorating and drying process the plate remains on a wooden board. The heavy coating of slip necessary for this effect softens the clay dramatically, so it is liable to collapse unless it is supported. If the form is press-molded leave it in the mold throughout so that it will not distort, and remove it only when it has stiffened.

Feathering a shallow dish

1 A background of the brown slip is poured onto a leather-hard, flat-bottomed platter of white clay. The excess is tipped out and the rim cleaned.

2 Parallel lines are trailed onto the background, using a white slip. It is important to maintain an even pressure on the slip trailer, which should be kept full, with the slip shaken down the nozzle. A steady hand is needed here and mistakes are easily made—if this happens, try marbling to hide the problem.

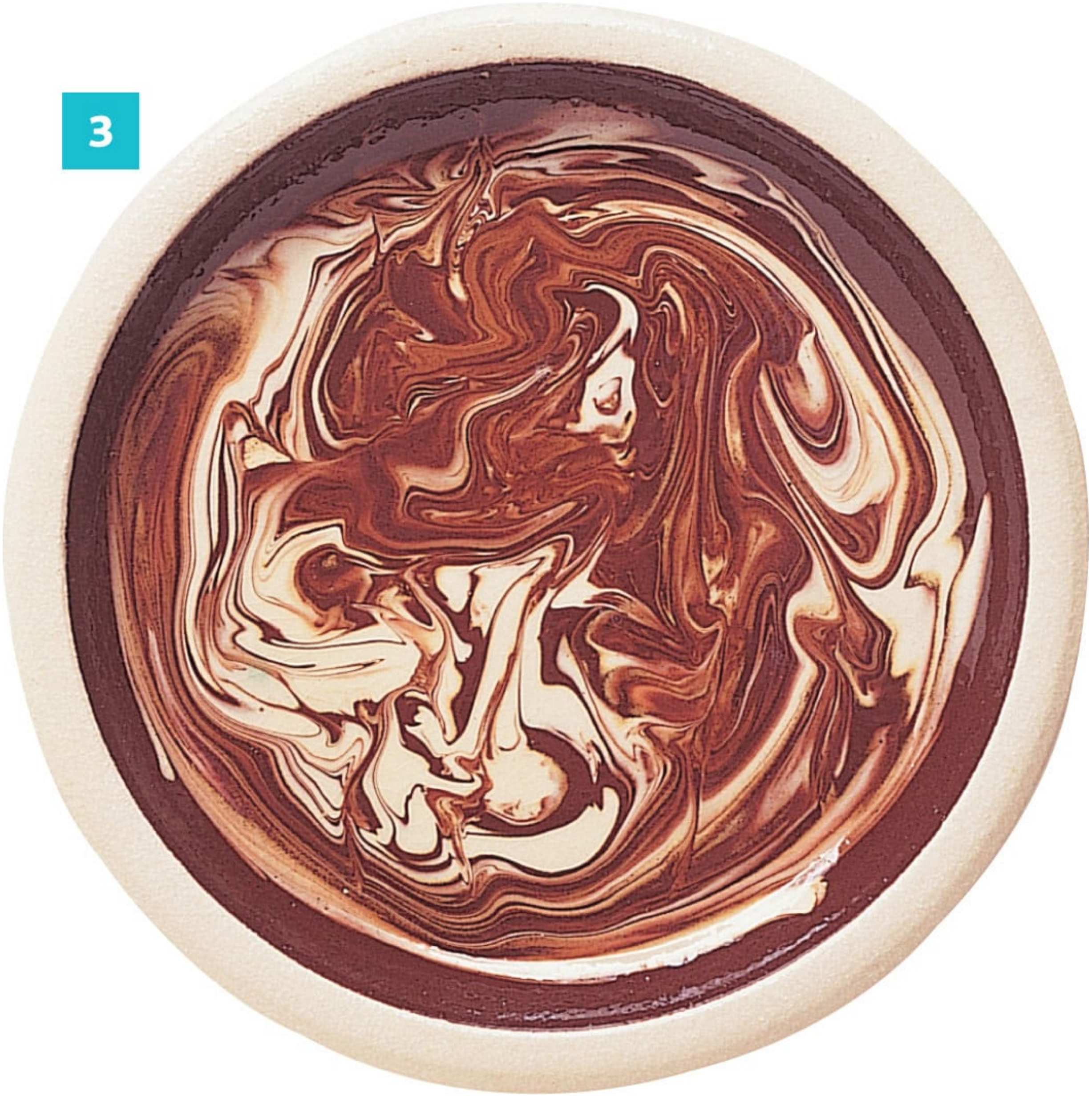


3 Use a feather to drag the slip in one direction, keeping the lines at equal distances apart. If mistakes are made the slip can be wiped off and you can begin again, but the pot will get softer and will be more liable to distort or collapse.

Marbling a shallow bowl

1 A background of liquid slip is applied in the same way as feathering, and then random dots of white slip are trailed on top.

2 The plate is then rocked to allow the slips to run together. Bold patterns will be produced at this early stage, becoming finer and more mingled with continued movement.



3 It is your decision when to stop. More movement will continue to blend the slip, and the lines will be less defined. The pattern is attractively varied, with more concentration of slip toward the edges.

Further Information

Slip decoration, pages 100–101
Pouring and dipping slip, pages 104–105

Painting with slip

Pouring or dipping slip (see page 104) can create a flat, opaque coating, but brushwork offers more subtle variations of thickness and shading. It is important to be comfortable with your brush, and to choose one that holds a lot of color as slip is heavy. Oriental brushes are especially suitable for a calligraphic approach, and broad ones, known as hake brushes, are good for coating a surface. Names such as “scriptliner,” “filler,” and “shader” give clues to the potential uses of various brushes, but ultimately the brush that works for you is the one to choose.

1 A monochrome design is built up with black slip applied with a Chinese calligraphy brush. The brush is very flexible and allows variation in the thickness of line.

2 The design itself is quite formal, but because the brush produces loose, flowing lines an individual effect is achieved.

3 The brush is very expressive and can be used in a variety of ways. Here the point is used to make dots.

4 A honey glaze was applied over the slip brushwork to bring out the rich colors.

Bold approaches
Bowls with slip brushwork by Jonna Behrens. In contrast to the plate in the demonstration, these two are decorated with dramatic, bold brushstrokes. The slip has been used quite thin, and applied with a bristle brush so that the clay color shows through.

Further Information

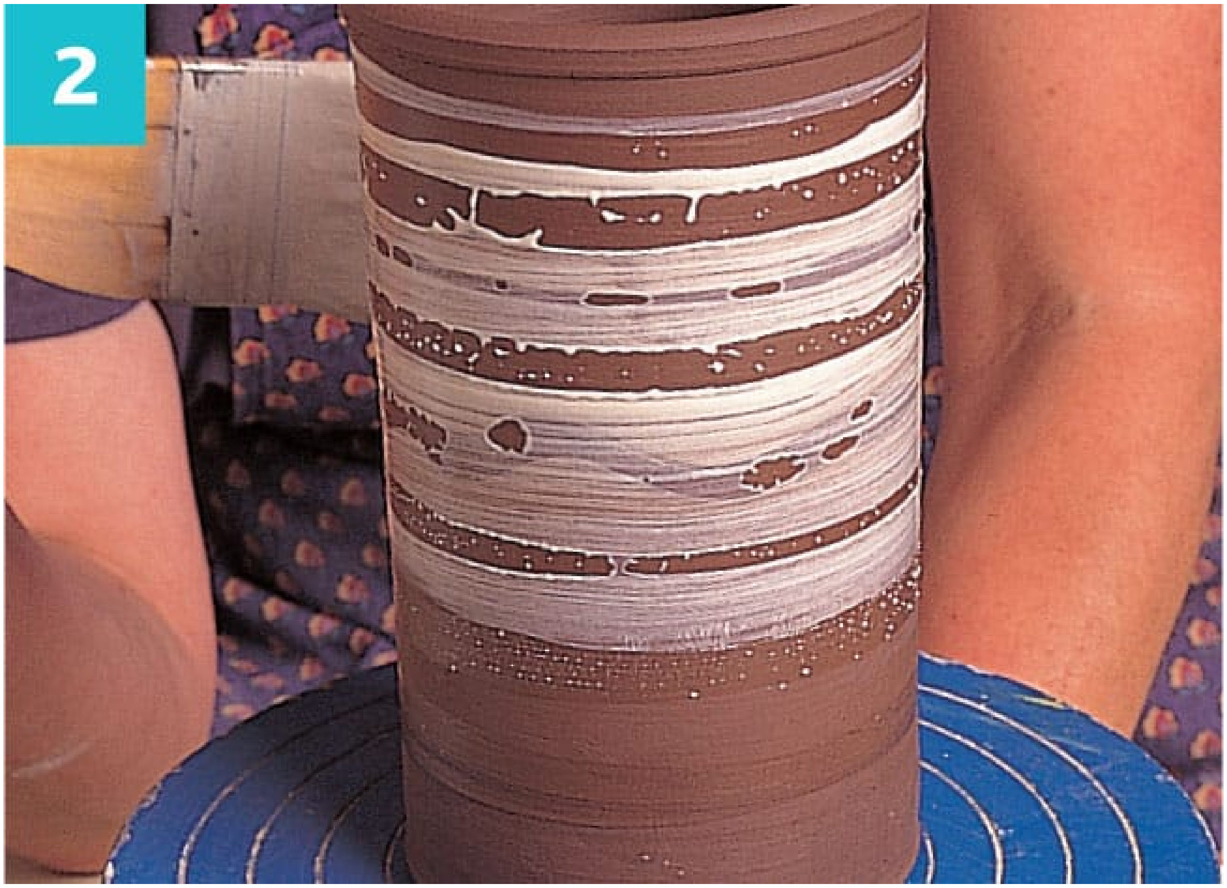
Pouring and dipping slip, pages 104–105
Slip trailing, pages 106–107

Banding and combing

Banding is the traditional method of applying lines or bands of color around a symmetrical form. It can be done at any stage of the process, from before completion to after firing. In the demonstration here, a special banding wheel is used: a rotating modeling stand that is usually made of metal. The wheel is rotated by "walking" the fingers around the stem of the wheel, maintaining control with one hand while painting with the other. However, banding can also be done successfully on a potter's wheel.

Banding a cylinder

1 Stripes of wax are banded onto a leather-hard cylinder as a resist, using a proprietary brush wax, which washes off brushes and is easier to manage than hot wax.



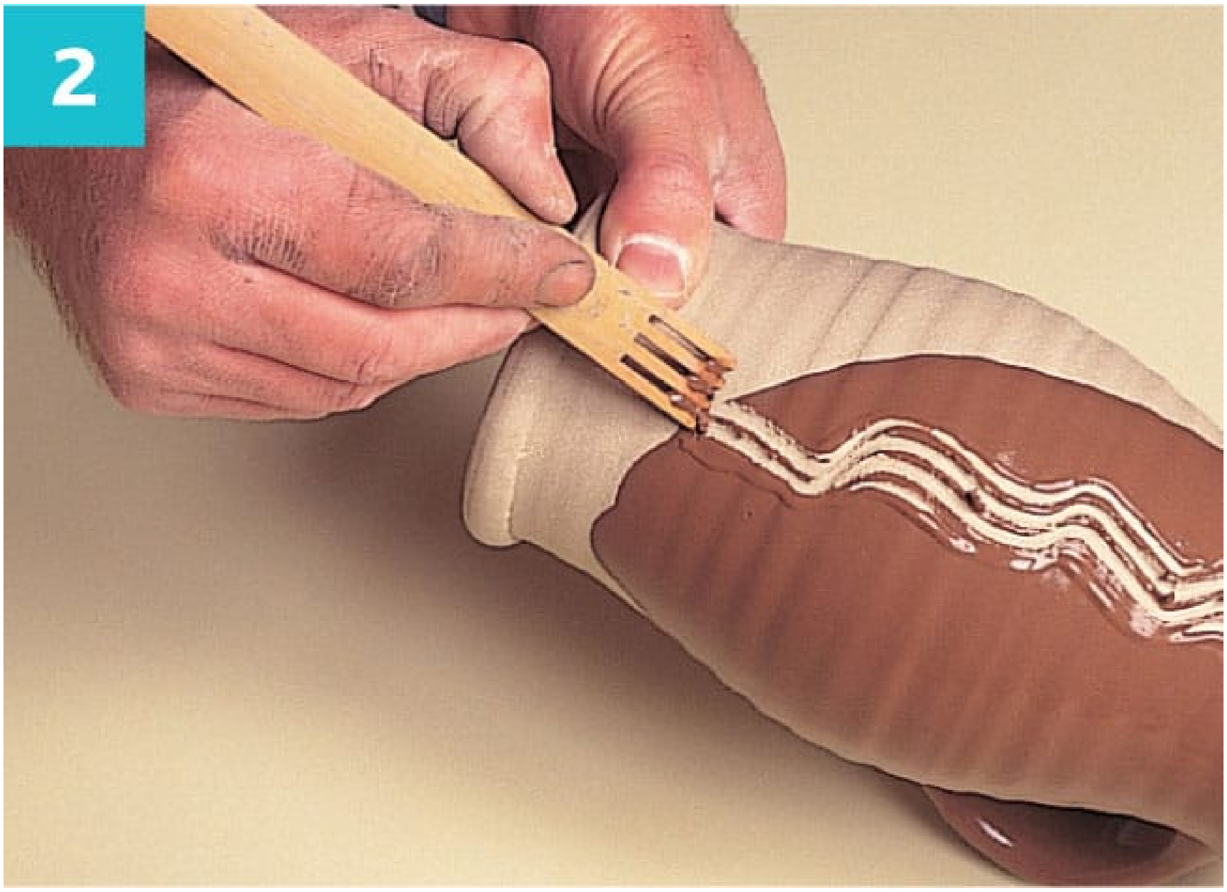
2 A flat hake brush has been used to apply a coating of slip over the stripes of wax. The coating is thin and shows the brush marks.

3 The banded piece is now ready for glazing with honey glaze and then firing. During firing the wax will burn away, leaving stripes of contrasting color.

Combing is another direct method of decorating, and a variety of implements can be used. Combing can be done through slip or into the soft clay itself. It is a technique that appears deceptively simple, but its effectiveness depends on the slip coating being exactly the right consistency —too wet and the slip heals over, too dry and the line is stilted and loses its fluidity. Combed slip varies in thickness and color density, and a carefully chosen glaze can accentuate this effect.

Combing through slip

1 Slip is poured down one side, then allowed a few moments to drain.



2 A bamboo tool is used to comb a pattern in the slip. This is done quickly, in a sweeping, fluid gesture.

3 Experimenting with different tools is part of the fun. Here the thumb is used to make interesting marks.

4

4 The pitcher was completed by salt glazing, a traditional glaze for this type of form. Notice that the potter has left the "throwing rings" showing rather than smoothing out the sides.

Further Information

Pouring and dipping slip, pages 104–105
Using resists, pages 116–117

Mocha jug

Mocha ware is an unusual form of slip decoration that derives its name from a quartz known as mocha stone, which bears a moss-like pattern. The effect relies on a reaction between a wet coating of slip and a mixture of metallic oxide, tobacco, and water—acids such as vinegar, lemon juice, and wine can substitute for tobacco.

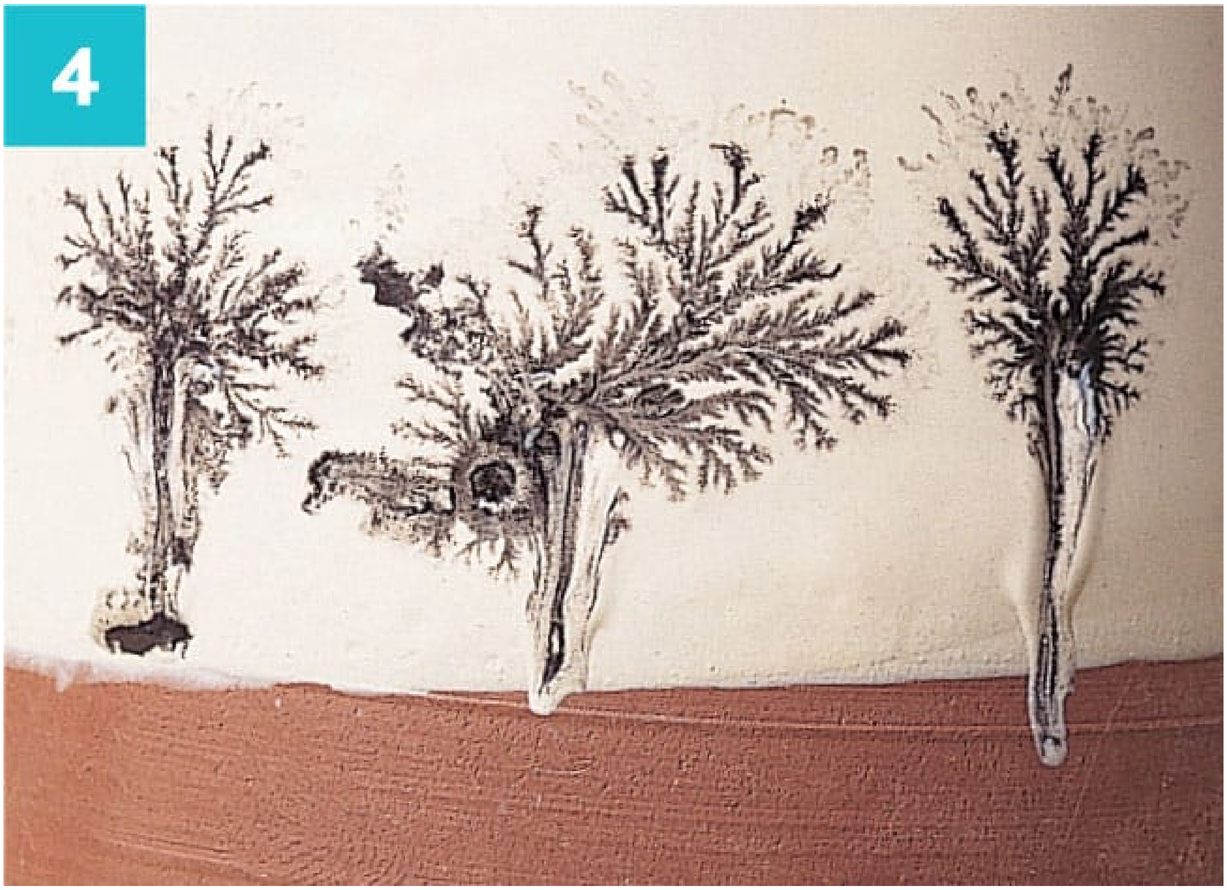
YOU WILL NEED:

- Leather-hard clay object
- Light blue slip
- White slip
- Bucket
- Powdered manganese dioxide
- Tobacco juice
- Slip trailer
- Fine paintbrush
- Serrated kidney palette

1 First the pot—here a simple jug—is dipped into a large container of light blue slip to approximately half way.

2 White slip is trailed or dotted on top of the blue, and dispersed a little to give a natural "clouds in the sky" effect.

3 While the slip coating is still wet, the pot is held upside down and a mixture of powdered manganese dioxide and tobacco juice is applied at the edge where the slip meets the clay.



4 As the juice migrates across the slip, it forms minute channels that are filled by the manganese. The slip coating must be fresh, and the whole process must be done speedily for the mocha effect to succeed.

5 The pattern is repeated around the jug and the artist adds "fencing" with sgraffito lines (see page 76) to further emphasize the landscape effect.

6 A serrated kidney palette is used to create a ploughed field, which completes the impression of a winter scene.

The finished jug
The finished piece was coated with clear earthenware glaze and fired to 2048°F (1120°C).

Further Information

Incising and sgraffito, pages 76–77
Pouring and dipping slip, pages 104–105

Using resists

There are many ways to mask off defined areas so that slip does not contact the clay surface. Hot wax is extremely effective and not difficult to use. Heat it in a double pan so that the vessel holding the wax does not come into direct contact with the heat.

Proprietary brush waxes, which do not need heating, are also available and latex is another useful material. Unlike wax, latex can be peeled off easily once its work is done, or it can stay in place and burn away during firing.

Resists can also be made from cut paper, as shown here, where paper shapes are used to decorate a leather-hard dish made from red earthenware clay.

1 Paper shapes can be cut in stacks, about six at a time depending on the thickness of the paper. Florists' wrapping paper was chosen here because it is thin and flexible but sturdy.

2 The pieces are arranged so that they form a pleasing design, but are not stuck down yet.

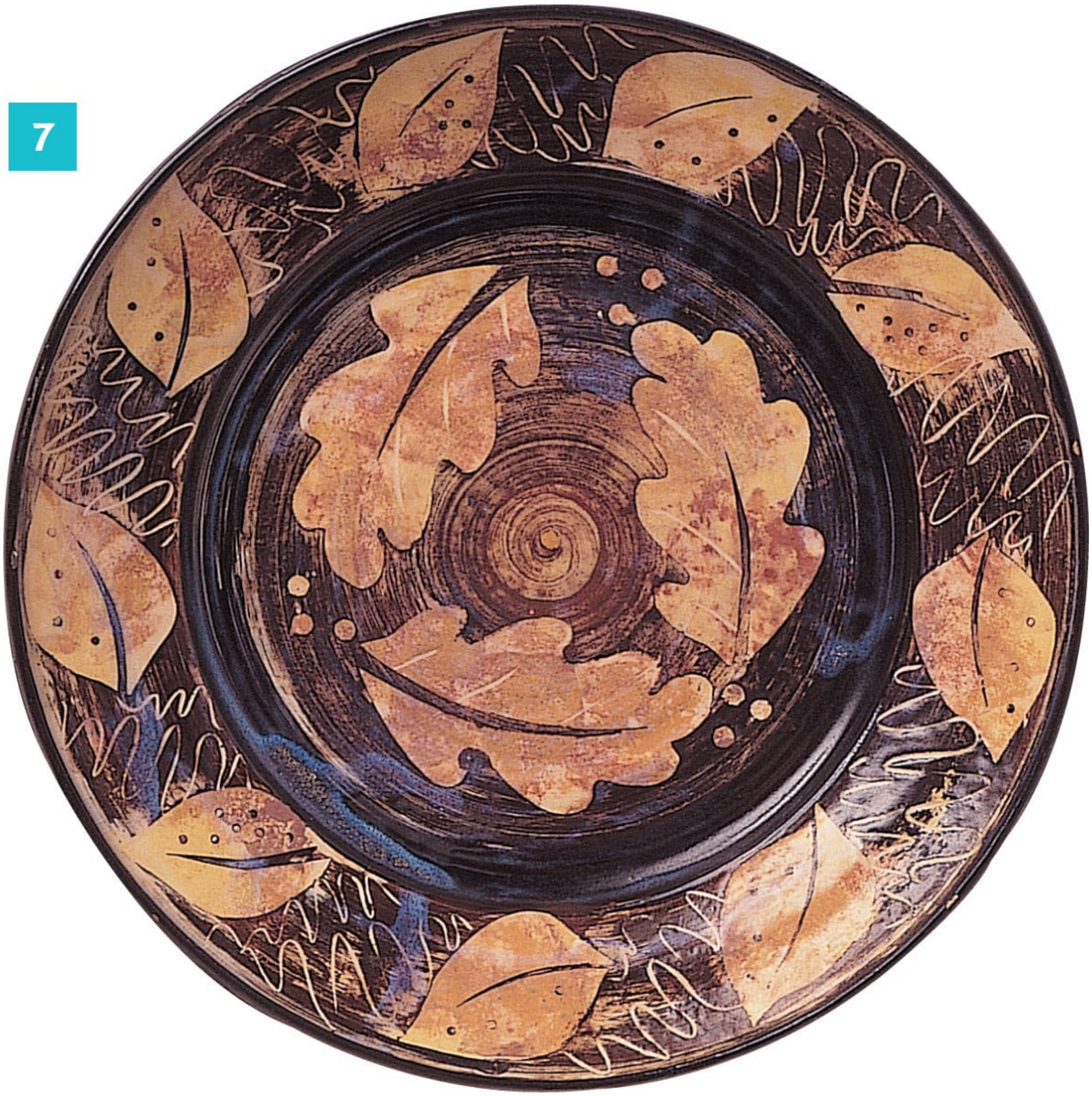
3 The cut-outs for the center of the bowl are dampened with a water spray or sponge and smoothed down before gently sponging a colored slip over the entire surface.

4 Once the first layer is touch dry, the leaf shapes are applied to the rim in the same way and a second layer of slip is sponged over them.

5 As soon as that layer is touch dry, any small additional shapes such as these small dots can be applied, followed by the final layer of slip.

6 As the dish dries, the paper begins to lift, and can be removed carefully with a pointed tool or needle.

7



7 To complete the dish, some sgraffito work was done on the rim, and it was given a clear glaze.

Further Information

Incising and sgraffito, pages 76–77
Slip decoration, pages 100–101
Painting with slip, pages 110–111

Underglaze colors

As the name implies, underglaze colors are intended to be applied beneath the glaze, usually onto bisque-fired ware. The colors are based on metallic oxides, such as iron, cobalt, and copper, and are commercially treated so that they are stable and consistent. The colors will vary, however, according to a number of factors: the color of the clay body or slip coating beneath, the type of glaze applied over them, the thickness of application, and so on. Metallic oxides can also be used in their own right as underglaze colors, and tend to be stronger.

Application is a skill, and practice is needed. A frequent mistake is to apply the color too thickly, so that the glaze is partially repelled and does not flow evenly across the work. While the color in the pot often represents the fired color, this is not a universal rule so it is wise to pay attention to labeling (some blues appear purple in the pot, for example). Underglaze colors can also be mixed with metallic oxides to increase the palette, but as with all mixing of ceramic color, take nothing for granted, and make extensive tests.

Underglaze decoration is especially durable, since it is protected by a glaze, and is traditionally used in the manufacture of tableware. It can be applied in many ways, including painting, printing, or spraying.

WARNING

Many ceramic materials are potentially toxic, and underglaze colors are no exception. They should not be ingested under any circumstances, so no eating, drinking, or smoking in the workshop. Dust from underglaze colors should not be inhaled. Always spoon powders out of pots rather than tipping them—and take steps not to create dust at all wherever possible. Fused into or applied underneath a fired glaze they pose no hazard to health, but unglazed they should be treated with caution, and pieces that are decorated in this way should not be used for food.

Underglaze colors
The colors come in three main forms: as a powder, to be mixed with water or a medium; as ready-to-use mixtures; as crayons or pencils.

Mixing underglaze colors

1 It is advisable always to mix up small amounts of color at a time; large amounts will dry out, and will have to be ground up when hardened. Spoon your colors into a palette, saucer, or glass jar, and keep them apart.

2 Using a slip trailer, gradually add water to the powder color; the trailer gives good control of the amount of water. Ideally, the mixture should be the consistency of thin cream. If it is too thick, it will blister the glaze; if too thin, it will be weak looking.

Underglaze pencils

These are a solidified version of the powdered form with flux added and are useful for adding touches of detail. The powdery finish of the pencil line is easily smudged, so take care. Pencils are usually only available in a limited range of colors.

Underglaze crayons

These are a softer and a wider version of pencils. They behave in a similar way to drawing chalks, allowing larger areas to be covered in a variety of marks. Like the latter, they create a fine dust around the drawn lines that can be blown away easily.

FURTHER INFORMATION

Underglaze printing, pages 120–121
Metallic oxides, page 155

Underglaze printing

Underglaze colors can be printed onto bisque ware using a variety of methods. In the ceramics industry, decoration is often applied by screen printing. The studio potter can use this method too, but industrial equipment is needed to print onto ware that is not flat. Bisque-fired tiles are sometimes available from pottery suppliers or tile stores and can be printed quite easily.

Underglazes can be printed using rubber or sponge stamps. Rubber stamps can make a very precise print, while sponge printing provides possibilities for more free and fluid images. Stencils can also be used: printing through stencils can be as simple or as complex as you wish. In its most basic form, a drawing on paper is cut out by hand with a sharp craft knife and then slips, oxides, or glazes are either painted or printed through the paper stencil.

Sponge printing

1 The plate was coated with a white slip and biscuit fired ready for decoration. Marks were drawn on the sponge with a felt tip pen, and shapes were cut out. Yellow is painted on to the lemon-shaped sponge, and blotted onto paper to avoid excess color.

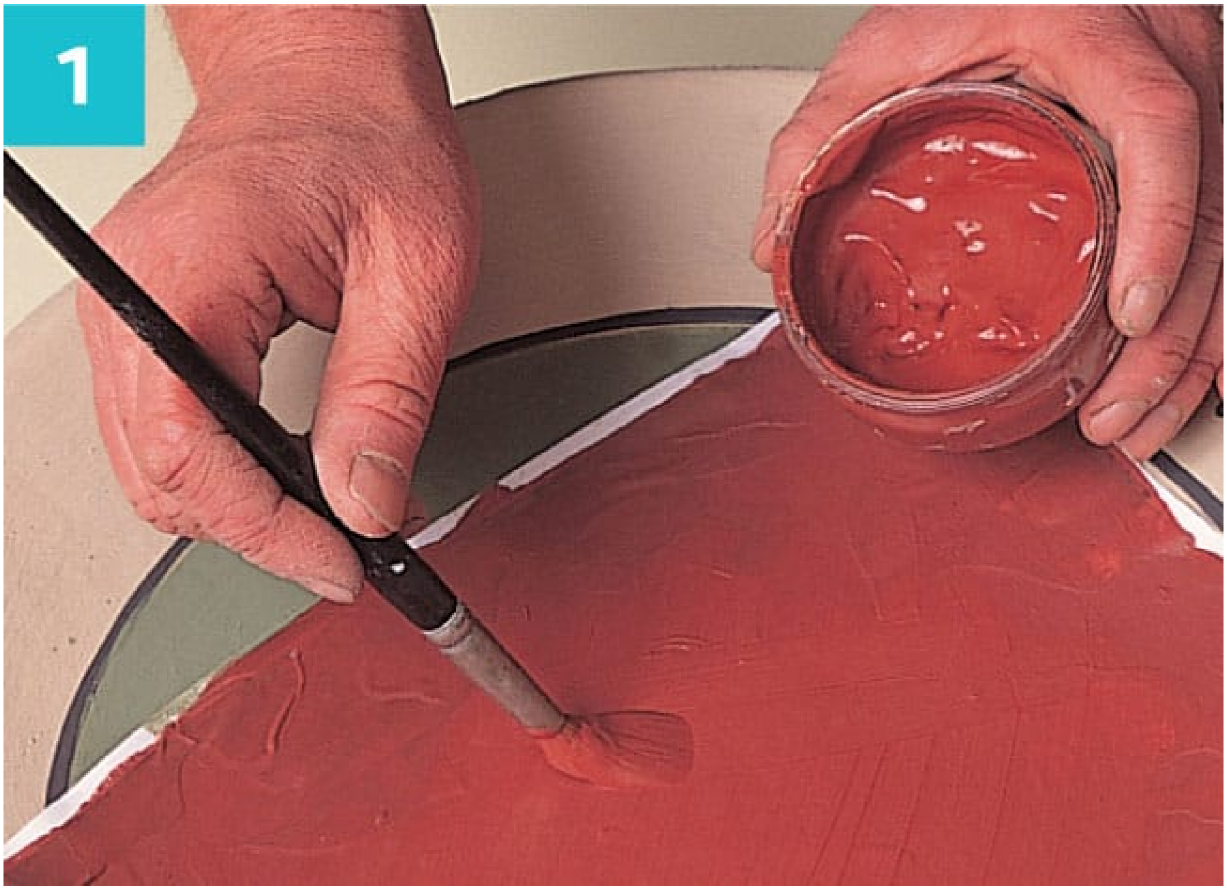
2 Lime green is added to the sponge and used to overprint the first lemon, creating realistic shading.

3 The leaves are printed in the same way: first green, and then a little cobalt oxide is used to highlight the veins and build up layers.

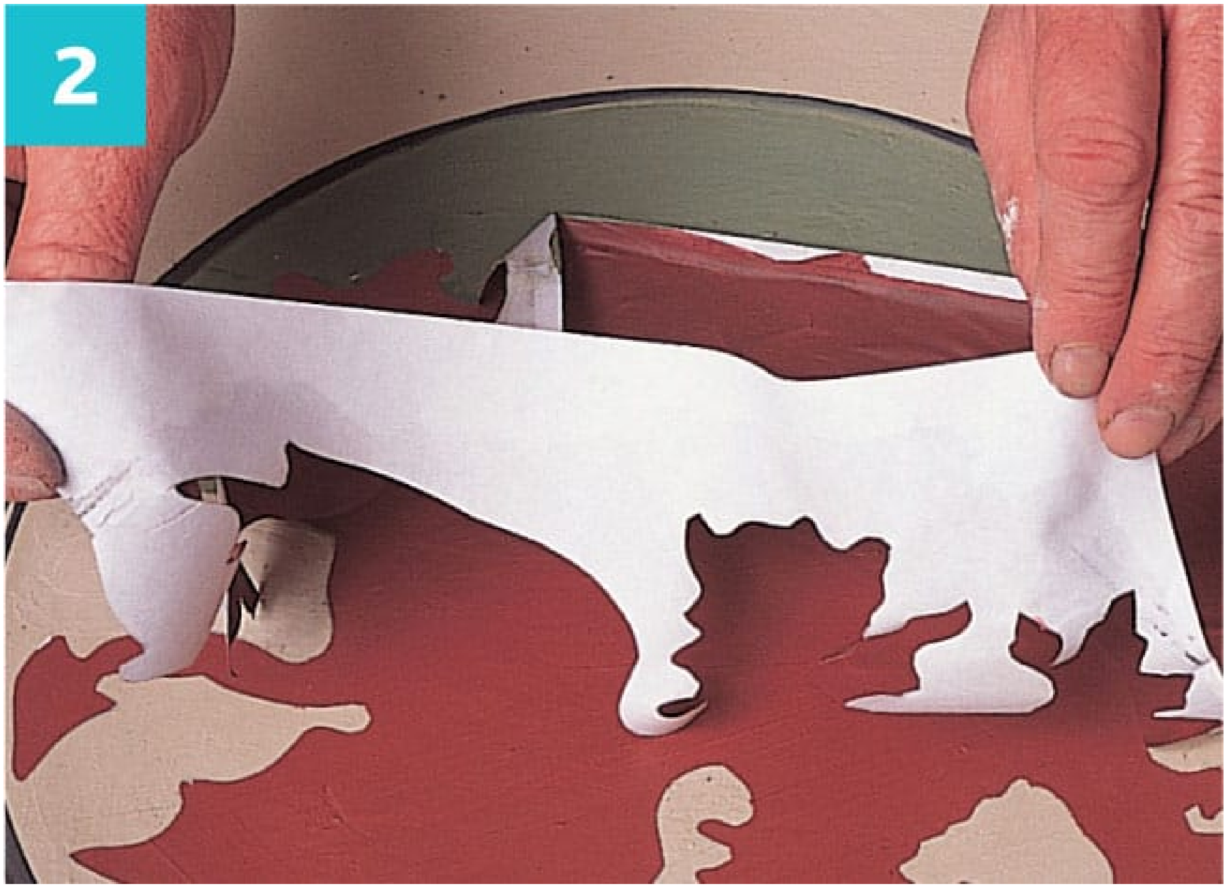
4

4 Clear glaze was applied and the plate was fired to 2102°F (1150°C).

Hand-cut stencils



1 The design is drawn on paper and carefully cut out with a sharp craft knife. The stencil is then dampened slightly so that it will adhere lightly to the clay and gently pressed down with fingertips. The required slip, oxide, or glaze is then applied. Here, an iron-rich slip is painted over the paper stencil with a soft brush.



2 The slip can be dried gently with a hair dryer until it is touch dry, after which the paper is carefully peeled off to reveal the stenciled design.

FURTHER INFORMATION

Using resists, pages 116–117
Underglaze colors, pages 118–119

Slip-decorated pots

The possibilities of slip decoration are almost endless. On these pages we see traditional uses of the method, from the inspirational work of the 17th-century English potter Thomas Toft to the less conventional techniques of a modern Korean potter.

TRADITIONAL SLIPWARE

The wonderful slip-trailed work of Thomas Toft in 17th-century England has provided inspiration for many contemporary potters.

BOLD SLIP TRAILING

The enjoyment of decoration is ever-present in David Miller's work, with the surfaces becoming canvases for his vigorous and immediate slip decoration. All of his pieces are made from red clay coated with a white slip onto which stained slips are painted. They are then wood fired (see pages 180–181) to 2050°F (1120°C) with a thin matte glaze.

WIPING SLIP

Kang Hyo Lee, of the master Ongii potters of Korea, throws using thick coils of clay on a traditional kick wheel. The slowness of the wheel's rotation and the softness of the clay give his work simplicity and freshness. Slip was wiped on with his hands, retaining all the vigorous finger marks.

THE DARTINGTON POTTERY

The highly colorful decorative surfaces of this functional group owe much to the skills of Janice Tchalenko, who played a prominent part in establishing the Dartington Pottery as a commercial pottery with strong roots in studio traditions. The bright decoration was achieved through a combination of brushing, trailing, and sponging techniques.

Slip decoration effects

The images on these pages demonstrate how potters have developed their own decorative vocabularies through experimentation to achieve effects that range from elegant simplicity to graphic art approaches.

RESIST DECORATION

JUDITH WOOTON

This traditional urn-shaped stoneware vase by Will Singleton has been decorated with a simple but highly effective design of leaves, applied as resist with slip. Notice the clean edges produced by this method. use of colored clays.

COMBINED TECHNIQUES

Jill Fanshawe Kato has decorated her press-molded dish with poured slip, paper resist, some incising, and a cleverly placed handprint.

TILED PANEL

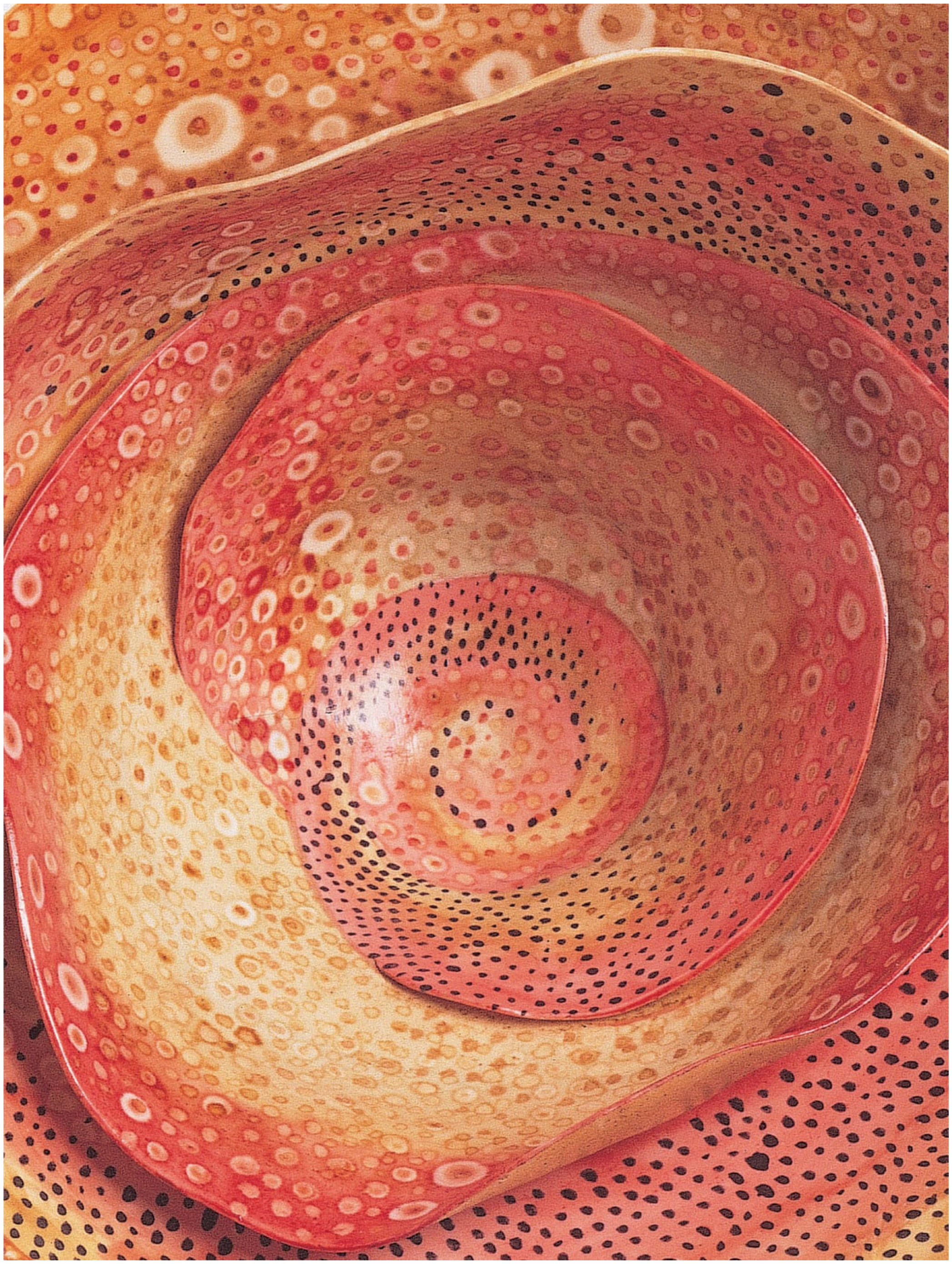
Flat surfaces like this allow the potter considerable scope, and here Paul Scott has treated the porcelain panel very much like a canvas for painting. He has used underglaze painting, sponge printing, and sgraffito under a transparent glaze.

INDIVIDUAL STYLES

Jan Bunyan's teapot was painted with underglaze colors after bisque firing, using bold, sweeping stokes that follow the form. It takes a good deal of practice to work boldly with large brushes.

CHAPTER 5

GLAZES AND POST-FIRING TECHNIQUES



Glaze can be purely functional, strengthening the clay body and making it non-porous, but it can also be purely decorative, admired for its rich color or gloss, and many studio potters plan their work with the type of glaze in mind. The following pages explore just a few of the marvellous effects that glazes can impart, but always remember that while a glaze can enhance a good pot it cannot turn an ill-considered form into something beautiful.

Decorative use of glazes

The origins of glaze are said to lie in ancient Egypt around 3000 BC, when sand impregnated with salt became fused by fire. Silica (sand) is the glass-forming ingredient of glaze. The other two constituents of a basic glaze are aluminium oxide (a stiffening agent), and flux (an agent that causes the mixture to fuse). Color can be added in the form of metallic oxides or ceramic stains, but is present in some raw materials also.

The chemistry of glaze is fascinating but complex, and you will find further information together with recipes on pages 156–167. Although glazes can be bought ready made, many potters mix their own, which is a great learning process and also more economical.

Bear in mind that glaze application takes practice, and the beginner may be disappointed by runs, drips, and patchiness. Experience will tell how thickly a glaze should be applied for the desired effect: a universal rule is about the thickness of light cream. Application should be as even as possible, and the glaze must be allowed to dry before being touched.

Making tests
Make test tiles by applying glaze to bisque-fired tiles, then re-firing them. Firing the tiles in an upright position helps to give an indication of how the glaze will behave on a vertical surface such as the wall of a pot.

WARNING

Some glazes are unsafe for domestic use. Toxic metals may leach out—when they are not completely fused within the glaze, the surplus metal remains soluble. When formulating glazes for food use it is wise to have them professionally tested by a metal-release test. This test measures the amount of toxic metals released by a glaze into a solution of acetic acid, simulating the effects of using the vessel for wine, vinegar, fruit juice, and so on. Above a certain level, the glaze would not be acceptable. Glazes containing compounds of lead, barium, cadmium, selenium, or large amounts of copper oxide are especially risky. Specialist advice should be taken from a glaze chemist, or your supplier, if there is any doubt.

Temperature bands

Glazes can be formulated to mature at all temperatures, but for practical purposes “temperature bands” between about 1652°F and 2642°F (900°C–1350°C) are generally used. The higher the temperature, the harder and more durable the clay and glaze. Four commonly used temperature bands are:

	Firing range °F	Firing range °C
Earthenware	approximately 1922–2156	1050–1180
Stoneware	approximately 2192–2372	1200–1300
Porcelain	approximately 2264–2462	1240–1350
Raku	approximately 1652–1922	900–1050

Oxidized firing

Thrown oxidized stoneware pot by Katrina Pechal with a lithium glaze over a silicon carbide slip. The glaze is applied in layers to vary the richness in texture. The glaze reacts with the silicon carbide, giving texture, while oxides are added to the glaze to give color.

Combined techniques
Thrown platter by Victoria Hughes, tin glazed and decorated with wax resist and cuerda seca technique (see page 132) along with oxides and underglaze colors.

Further Information

Painting glazes, pages 132–133
Coloring oxides, page 157–159
Glaze recipes, pages 160–167

Applying glazes

Glazes can be applied by pouring and dipping, as with slip (see page 104). If the work is small enough to be held in one hand, these are excellent methods, and can create swathes of colored glazes, including overlap effects. To achieve these, apply each coat as soon as the one beneath is touch dry. If the glaze is too dry, it may bubble or be pulled off by the next layer.

Glaze can also be sprayed, a method that can bring a professional finish to a piece that might be difficult to glaze in other ways. Decorative effects can be achieved by blending one glaze into another, or by spraying a different pigment over or under the glaze. Spraying through a mesh, or deflecting the spray with a piece of cardboard, can create masking patterns. Resists can be attached to the surface using any material that remains in place long enough to be sprayed—masking tape or pads of damp clay, for example. Beware of using resists that are nonporous, because the glaze may quickly be repelled, causing drips.

Dipping in glaze

1 The base of this pot is coated in brush wax (see page 116) to repel the glaze where it is not required. (Glazing the base is only possible if the pot is to be fired on stilts, and these are not commonly used at stoneware temperatures.)

2 When the wax is dry, the pot is dipped sideways into a bowl of glaze that is sufficiently wide and deep to accommodate it.

3 When the glaze is dry enough to touch, the pot is held and dipped the other way, overlapping the first glaze in the middle.

Spraying glaze

1 A white glaze is sprayed over the entire pot. Spraying should be as methodical as possible to ensure an even application. It is important that runs don't develop—as soon as the glaze appears wet, move on to the next area.

2 A second glaze (in appearance gray but actually green) is sprayed over the first. Do not spray too closely to the pot or the application will be too concentrated in one place: 12 inches (30 cm) is about the right distance, but this depends to some extent on the power of your spray gun and the effect desired.

3 The colored glaze merges from top to bottom—thick to thin. All glazes are likely to appear quite differently according to the thickness of application, and this is a matter for experimentation.

Tips for spraying

- Spray from a distance of at least 12 inches (30 cm) to allow the spray to fan out a little.
- Most spray guns have adjustments that allow the spray to vary.
- Clean your spray gun regularly and thoroughly, as glaze is abrasive and will wear out the delicate mechanism easily. Always spray clear water through the gun after use to clear it out, and take it apart frequently to check for a build-up of glaze residue.
- A sprayed surface has a tendency to mark easily, so handle with care or preferably do not touch at all until after firing.

Further Information

Pouring and dipping slip, pages 104–105
Using resists, pages 116–117

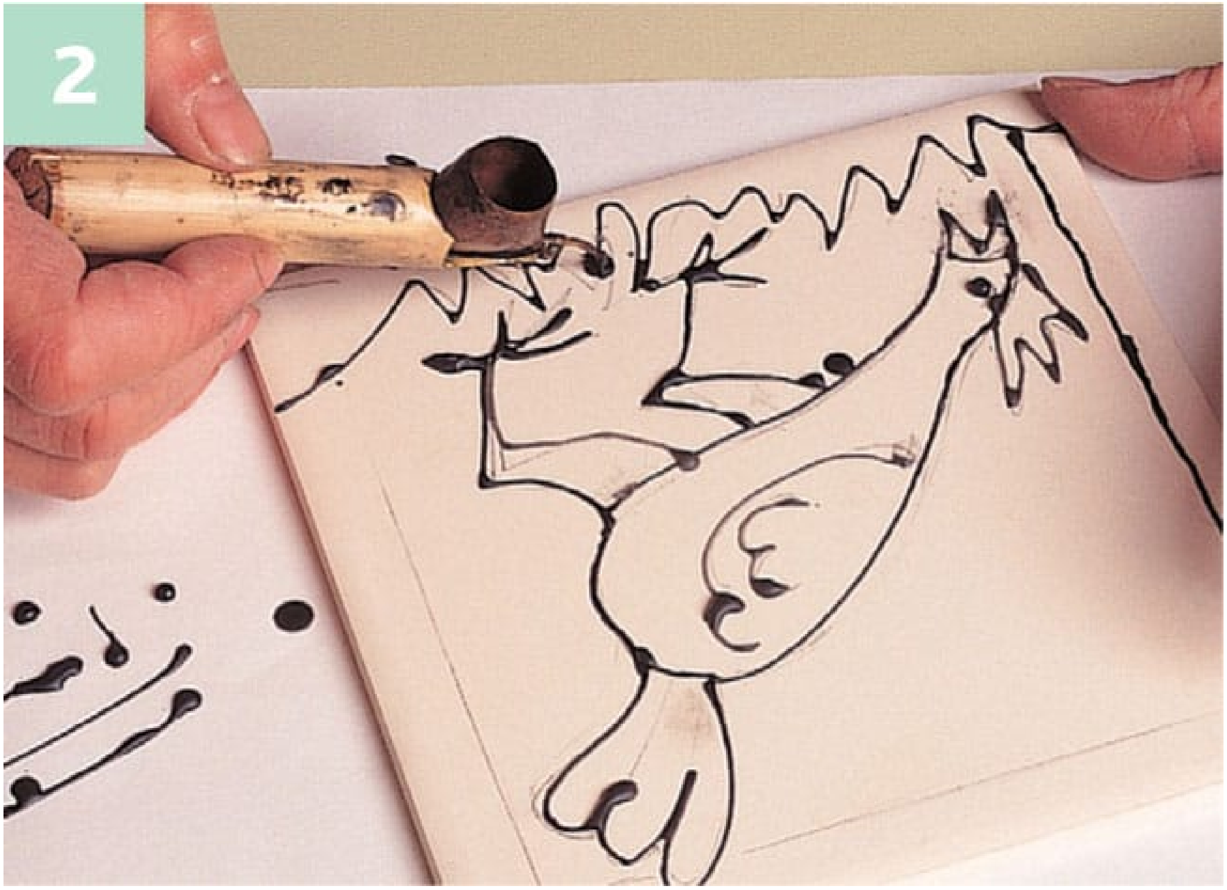
Painting glazes

Applying paint with a brush is useful when decorating a single piece—it would take far too long for mass-produced ware or a matching set of pots. Although any glaze can be applied in this way, brush-on glazes are manufactured specifically for this purpose. They have an added suspending agent, which gives a thicker consistency than a normal glaze. They come in a wide range of colors and surface quality, for either raku, earthenware, or stoneware firing temperatures.

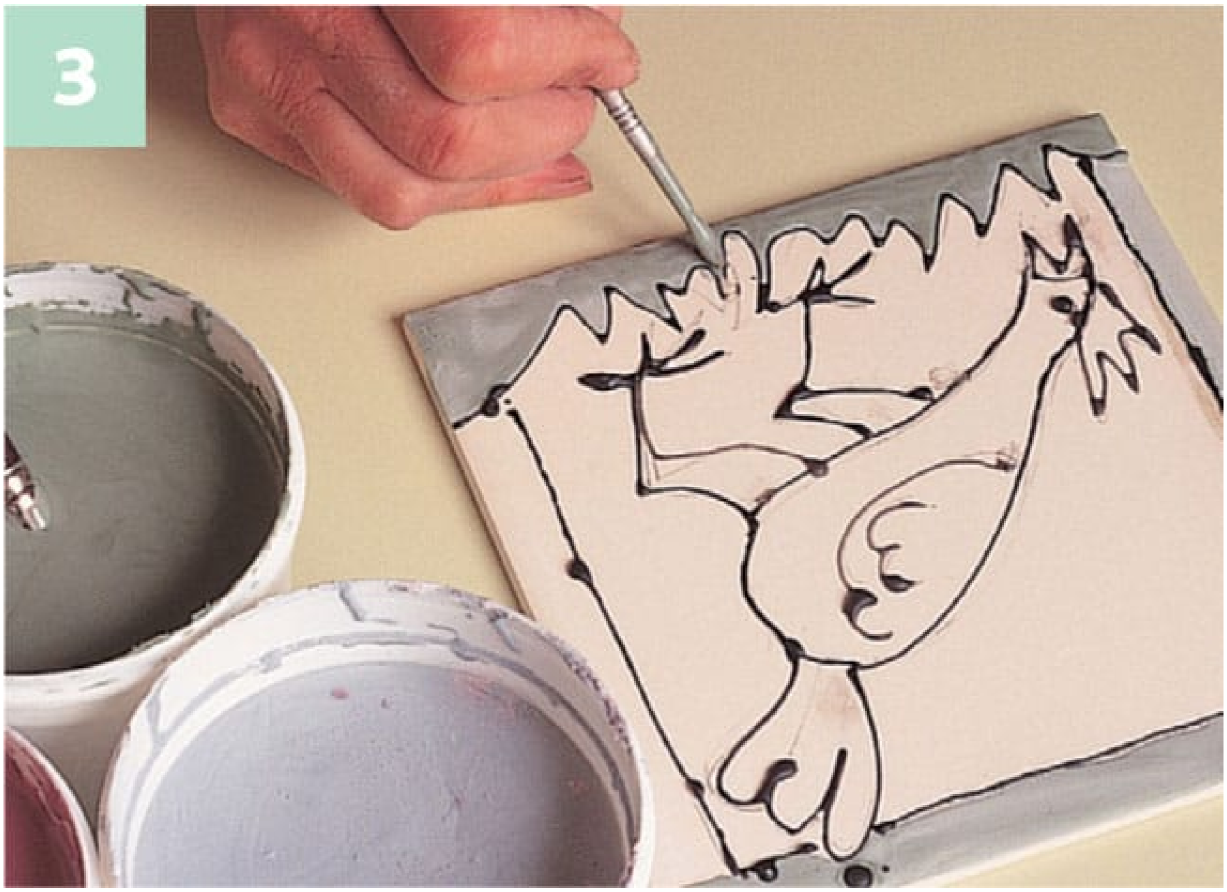
Glaze should be applied thickly for a solid color, up to four coats may be necessary; thinner or single coatings will result in a more transparent finish.

The method shown below is a version of a Moorish technique called *cuerda seca* (“dry cord”). Hot wax mixed with manganese dioxide is drawn directly onto tiles. The wax acts as a resist, creating a barrier between the glazes and allowing different colors to be used alongside one another without spreading. It is a very effective technique for outlining, as the manganese leaves a dark line as the wax burns away in firing.

1 Paraffin wax and a little beeswax are melted in a double pan (water in the bottom part, so that the wax is not in contact with direct heat). A small quantity of manganese dioxide is added.



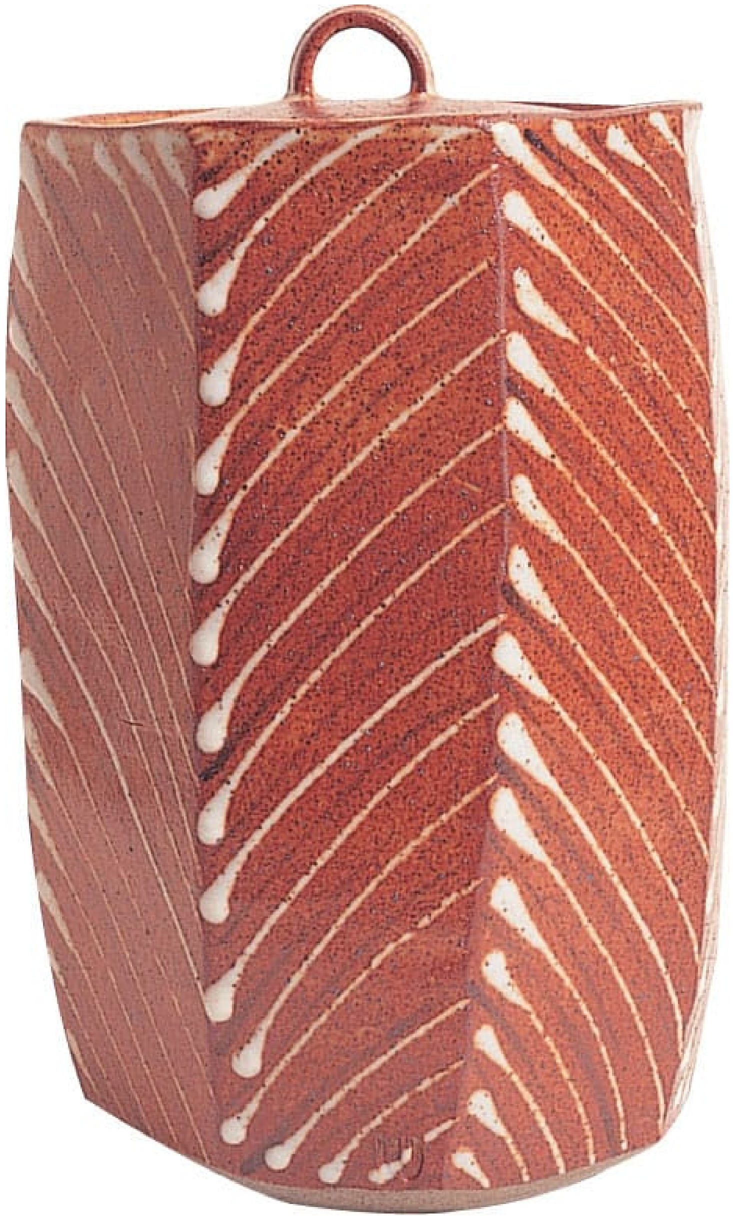
2 A pencil outline is first drawn onto bisque clay or industrial tile. The design is then drawn in wax, using a traditional batik tjanting tool. This has a reservoir to hold the wax, and acts in a similar way to a slip trailer, though the lines are typically finer.



3 Areas between the outlines are filled with brush-on glaze, using a soft brush. Colors are built up with care to avoid crossing the wax line. Some glazes require several applications, and the manufacturer's advice should be followed.

Resist
Tiles by Bronwyn Williams-Ellis, decorated with glaze applied with layers of resist.

Bold patterns
Jug by Clive Davies, with a bold solid pattern painted in red and green glazes.



Trailed glaze
Stoneware lidded jar by Karen Ann Wood, with trailed glaze. Trailing glaze is an effective method of applying one glaze over another.

Further Information

Slip trailing, pages 106–107
Using resists, pages 116–117

Majolica fruit bowl

Majolica is the anglicized term for maiolica, the white tin-glazed decorative earthenware that had its roots in the medieval Islamic world, but began to be made extensively in Italy during the 15th and 16th centuries. It is a form of in-glaze decoration, traditionally involving covering the surface of bisque-fired or raw-glazed pottery with an opaque white tin glaze, and painting colored pigments onto the white surface with oxides or underglaze colors before glaze firing.

YOU WILL NEED:

- Bisque ware to decorate
- Earthenware tin glaze (see page 161)
- Underglaze colors
- Brushes

1 This bowl (made from red clay and bisque fired) was glazed and allowed to stand for 24 hours before painting. This allows the surface to settle. Guidelines are drawn lightly with a soft pencil.

2 To begin painting, the colors are mixed with water, with the addition of a little glaze for the stronger hues.

3 The design is built up using a combination of finely painted lines and broad, free-flowing brushstrokes. The painting must be bold and direct.

4 The fine lines provide definition for broader areas of soft color, which are applied as a wash to give a shaded effect. During firing the colors will mellow somewhat, giving the characteristic look typical of this technique.

The finished bowl
When complete the bowl was fired to 2102°F (1150°C).

Further Information

Underglaze colors, pages 118–119
Painting glazes, pages 132–133
Coloring oxides, page 157–159

Salt and soda glazes

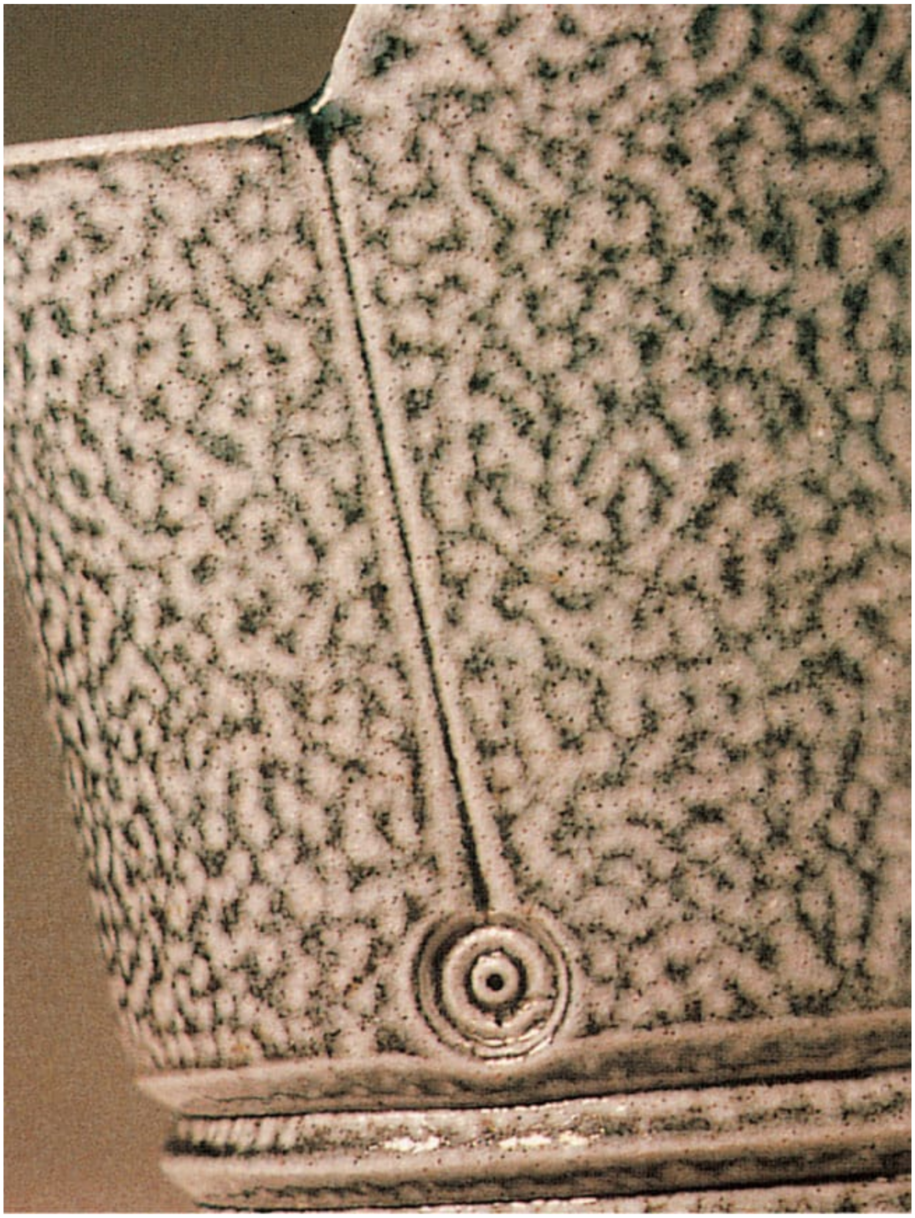
Salt glazing has been used extensively for many years in the ceramics industry for glazing drainpipes, bricks, chimney pots, and sanitary ware. The process is reputed to have begun in Germany in the area around the Rhine, where it quickly became popular for glazing all kinds of decorative stoneware, glass, and bottles. Soda glazing produces similar results but is safer to use. The effects of this type of glazing can range from flashes and blushes on pots to the deeply pitted, characteristic “orange-peel” finish.

The method involves introducing salt into the kiln either through the firebox or poured in through the spy holes from small metal boxes on rods. This is done at high temperatures, when the salt immediately volatizes and breaks down into its constituent parts: sodium and chloride. The sodium combines with the silica in the clay body to form the glaze coat, while the chloride is emitted from the chimney as hydrochloric acid in gas form. These emissions can be harmful, and kilns should ideally be situated away from buildings and people. Wind direction must also be considered.

Substituting soda (washing or baking soda) decreases the harmful emissions without altering the glaze surface. Soda has the added advantage of breaking down at lower temperatures, so many earthenware potters use small amounts of soda to liven up colors on their work. Soda can be introduced into the kiln chamber in a variety of ways. It is common to make a solution of the soda in warm water and spray it through the spy holes in the kiln, but soda itself will become a liquid if warmed on a hotplate. The liquid can be painted on to the split wood for stoking at the end of the firing. The soda re-crystalizes as it cools, and when the wood is stoked, the soda gently volatizes and is carried around the kiln with the flames.

Soda-glazed ware
This wood-fired kiln is being unpacked after a soda firing. The pieces all bear the marks of the flames and the characteristic flashes from soda.

Color effects
Large dish by Rosemary Cochrane with a dramatic color effect produced by a combination of slips and salt firing.



Surface texture

This detail taken from one of Walter Keeler's thrown, cut, and assembled jug forms is a good example of the typical "orange-peel" surface texture characteristic of salt-glazed ware.

Traditional shapes
The functional yet highly individual saltware of Gus Mabelson displays a well-considered use of technique. His traditional shapes are nicely complemented by his very contemporary use of decoration.

Further Information

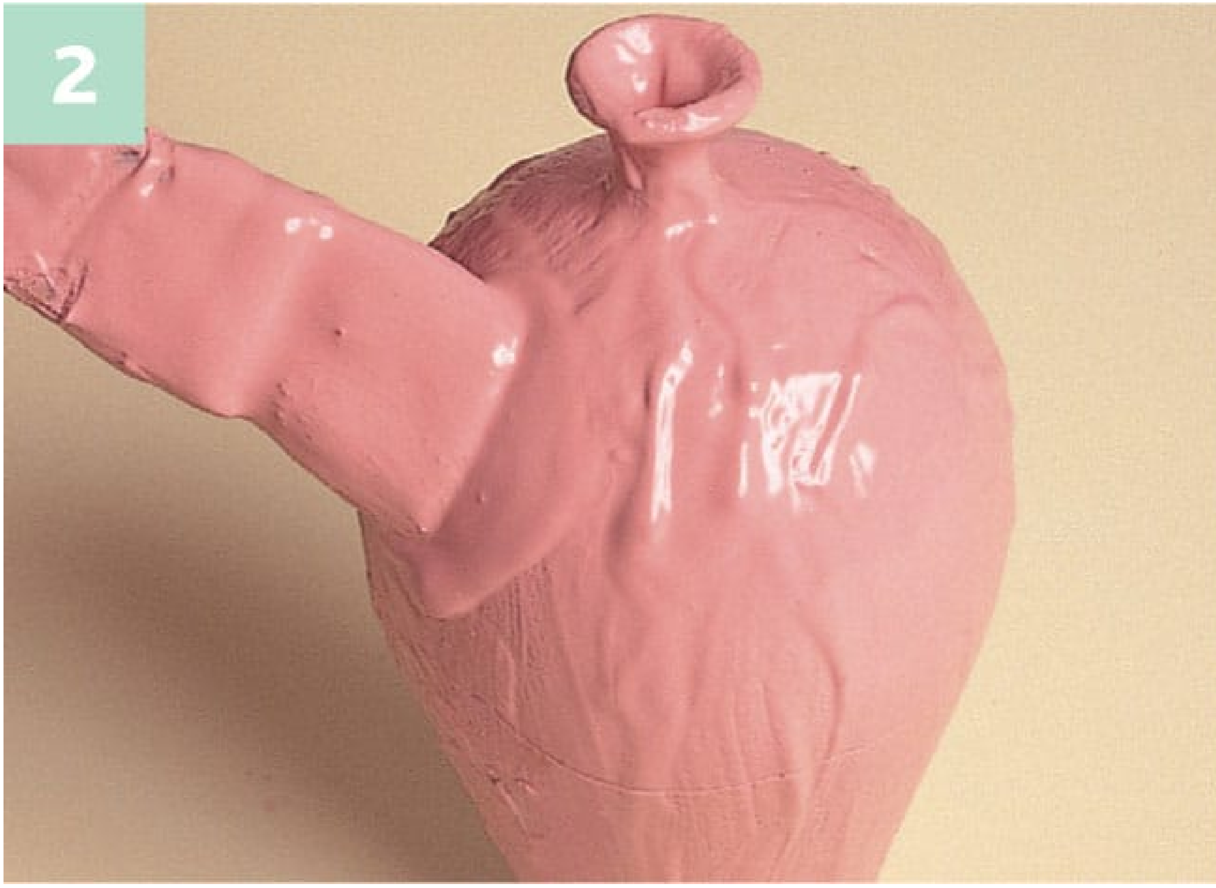
Textured glaze recipes, pages 166–167
Kilns, pages 168–169

Crystalline glazes

Large crystals can be encouraged to form in glazes containing zinc and titanium oxides, which act as the seed from which the crystals grow. The firing of crystalline glazes requires careful temperature control, involving rapidly heating the kiln to stoneware temperature so that the glaze becomes fluid (it is the glaze fluidity which determines the distribution of crystals on the pot), followed by rapid cooling to a temperature of approximately 2012°F (1100°C). This temperature is then maintained, or “soaked,” for anything up to five hours, during which time the crystals form.

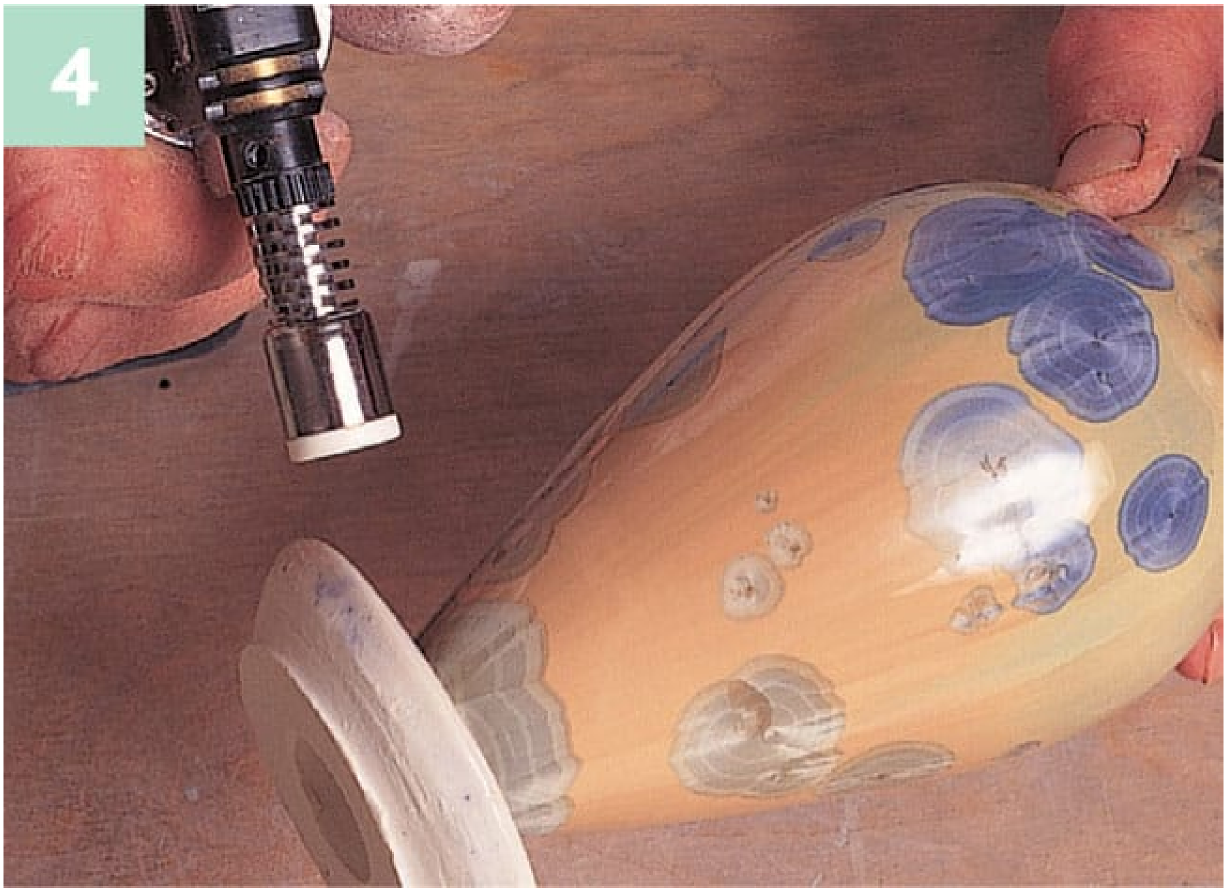
Because of the deliberate fluidity of crystalline glazes, adequate precaution needs to be taken to ensure that they do not run off the pot and fuse onto the kiln shelf. It is common practice to fire these pots on special bisque-fired saucers known as “catchers,” that serve to catch any glaze which runs off the pot. Excess glaze can then be ground off the base of the pot.

1 A "catcher" is thrown on the wheel and then bisque fired.



2 A thick layer of glaze is applied with a brush. Concentrate on the top of the form, because the glaze will run down.

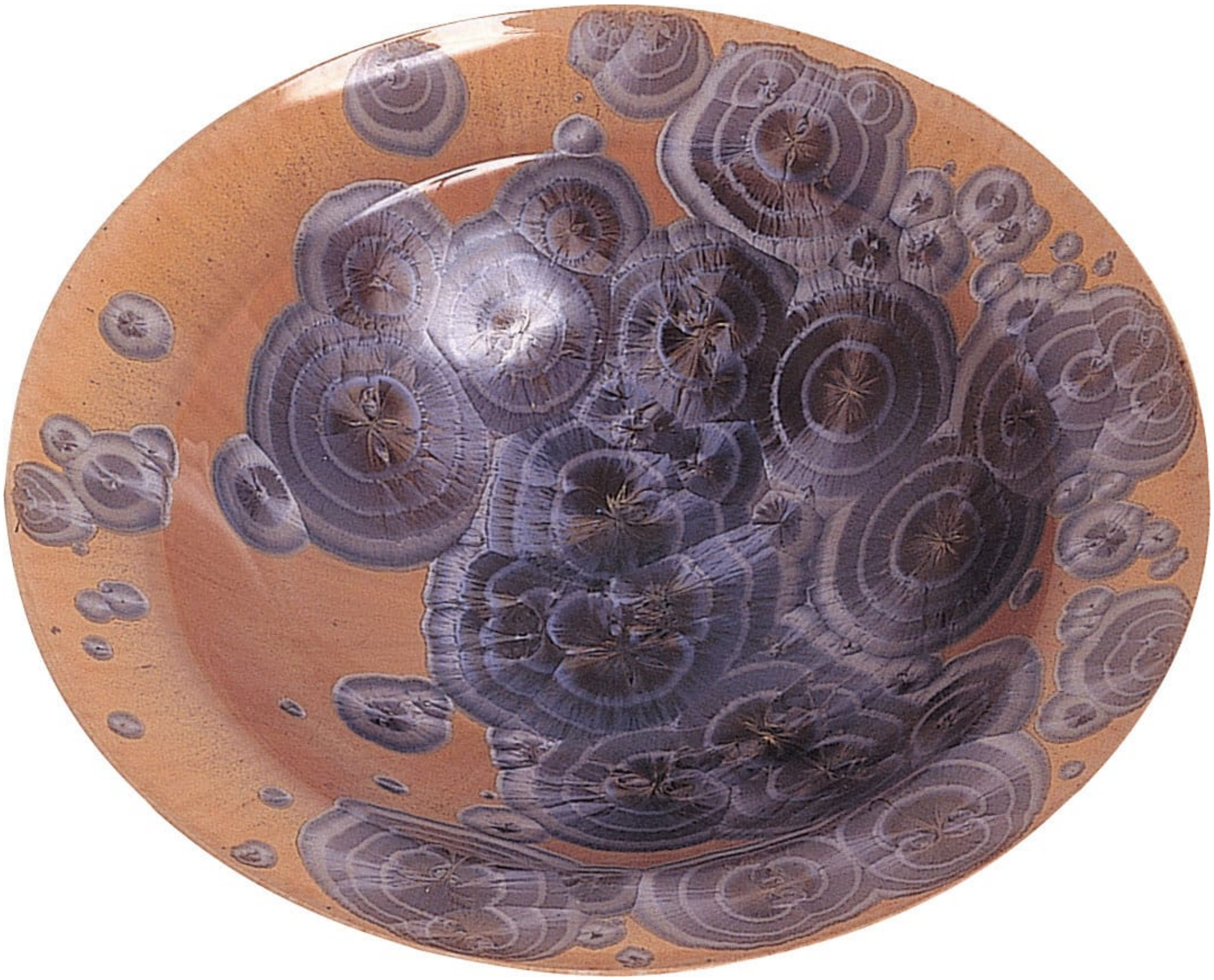
3 The pot is stood on the catcher ready for firing.



4 Due to the fluid nature of the glaze, the fired piece will become joined to the catcher, and must be detached with the aid of a needle-flame blowtorch.

5 The sharp edges are ground off with an angle grinder.

Close-up views
Details of pots by Kate Malone, decorated with crystalline glazes, which were painted on by hand. A complex cycle of firing and cooling causes the crystals to grow.



Technical expertise
Macrocrystalline glazed bowl by Peter Ilsley, who specializes in this technique and believes that success depends on three factors: glaze formulation, glaze application, and firing schedule.

Further Information

Macrocrystalline glaze recipes, pages 164–165
Packing and firing, pages 172–175

On-glaze enamels

Glazed and fired ceramics are usually regarded as “finished,” but this need not be the case, as additional pigments can be applied with on-glaze colors, sometimes called on-glaze enamels. These are pigments that contain fluxes to allow them to melt and fuse onto a fired glaze surface. Some are spirit based and require great skill to use because the balance of turpentine and oil in the mixture can be critical. More commonly these days, they are obtained in water-soluble form. Enamels provide the potter with a vast range of hues and colors, but while they are ideal for detailed work, they are less good for covering large areas.

Because they are made from a variety of pigments, not all colors fire at the same temperature. Some are fugitive at higher temperatures, especially reds and oranges, often based on cadmium and selenium. Several firings may be needed for a multicolored piece, starting with the highest firing color. Enamels are widely used in the ceramic industry, some hand-painted pieces (notably Royal Crown Derby, which also incorporates gold into the design) being fired a dozen times or more.

The optimum temperature depends to an extent on the base glaze to which the enamels are applied, so check suppliers’ recommendations. The glaze softens and combines with the enamel to form a permanent finish, though it is not as hard as most glazes, and continued abrasion or dishwashing may eventually damage it.

Guide to firing temperatures

Type of ware	Firing range °F	Firing range °C
Earthenware	1292–1472	700–800
Stoneware or porcelain	1436–1544	780–840

Enamel variations

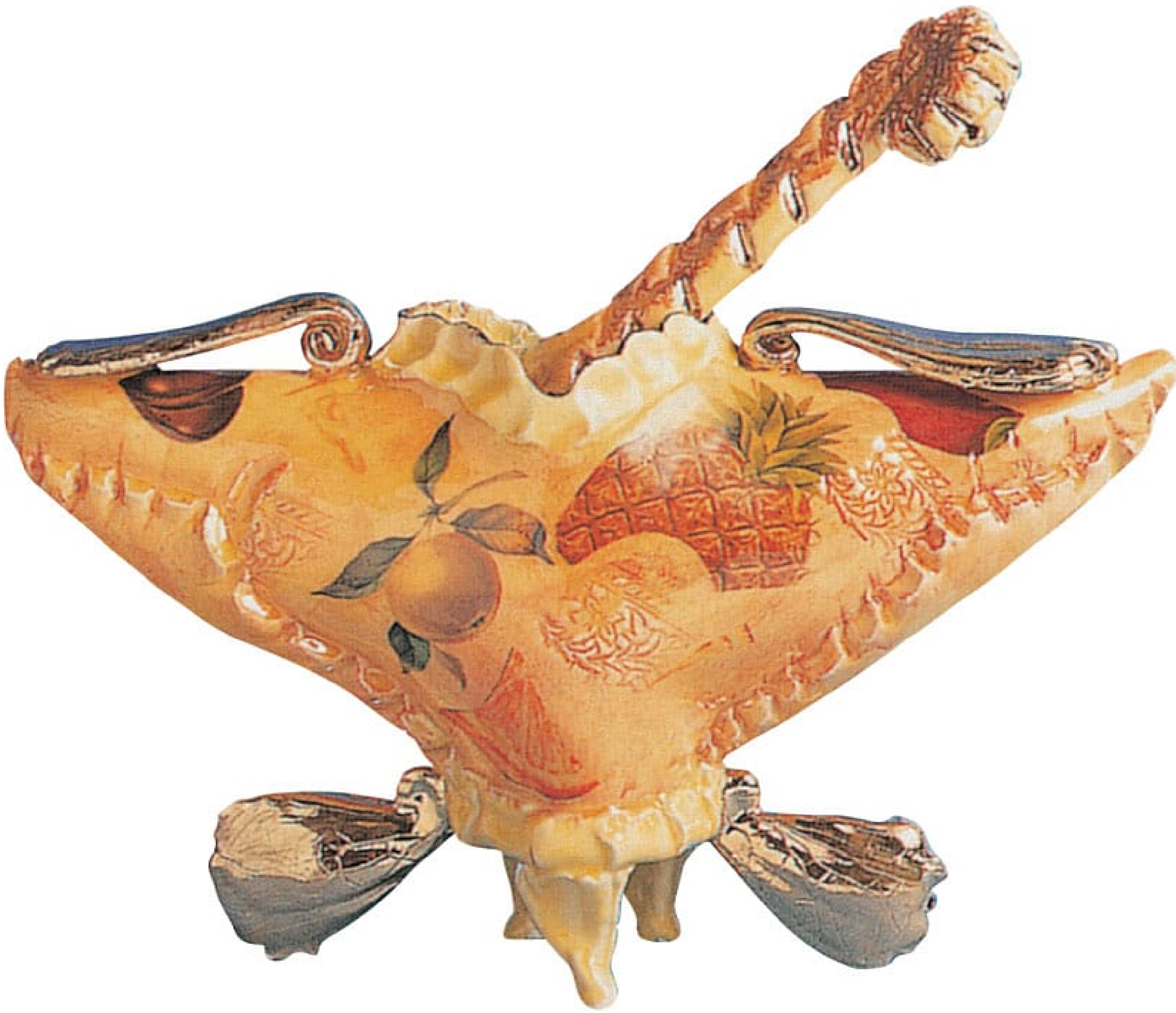
- Mix enamel with underglaze color to make it less glossy.
- Fire enamel to a higher temperature, so that it sinks into the glaze. While some colors may be lost if over-fired, others will give a pleasingly soft and blended effect.
- Use varied combinations of enamel or oxide on a glazed surface and re-fire to approximately the temperature of the original glaze.

Using decals

Signpost by Andrew Docherty. Slip-cast earthenware piece with underglaze decoration. Sheets of flat on-glaze color were cut up and applied as decals (transfers) on top of the glaze, and given a third firing.

Transfer prints
"Jelly-go-round" by Laura Vickers. Two-piece jelly mold with on-glaze enamels and transfer prints on slip-cast earthenware.

Enamels over slip
Bowl by Stephanie Redfern, with on-glaze enamels painted on to a background of colored slip previously fired to 2282°F (1250°C) but without glaze.



Luster transfers
"Tutti Frutti" by Philomena Pretsell. Slab built, impressed with a wooden fruit block, and stained with high temperature red stain. The transfers were gold luster, and the piece was fired several times.

Further Information

Underglaze colors, pages 118–119
Lusters, pages 142–143
Coloring oxides, page 157–159

Lusters

The easiest way to achieve luster effects is to use commercially prepared lusters. These can be applied to the surface of a fired, finished glaze, and be fired again to a low temperature in an oxidizing kiln. Exciting effects can also be achieved by working on unglazed surfaces.

Like on-glaze enamel (see page 140), luster fires just below the softening point of the glaze to which it is applied. Depending on the maturing temperature of the base glaze, it will require a temperature as low as 112°F (600°C) for low-fired glazes, and as high as 1742°F (950°C) for stoneware or porcelain, but optimum temperatures are best discovered through experiment. The chart below can be taken as a guide.

Luster can be applied in different ways according to the desired effect. Brushwork can be used to produce fine detail and individualized effects on a very smooth surfaces. An overall luster can be obtained by spraying. A spray gun or an airbrush is used, and the piece must be clean and dry.

Luster firing temperatures

Type of ware	**Firing range°F**	**Firing range °C**
Majolica-type glazes	1110–1295	600–700
Tiles and low-fired earthenware	1110–1560	600–850
Standard earthenware	1295–1560	700–850
China	1295–1650	700–900
Porcelain	1295–1690	700–950

(Courtesy of Charles Lamb)

Sprayed luster

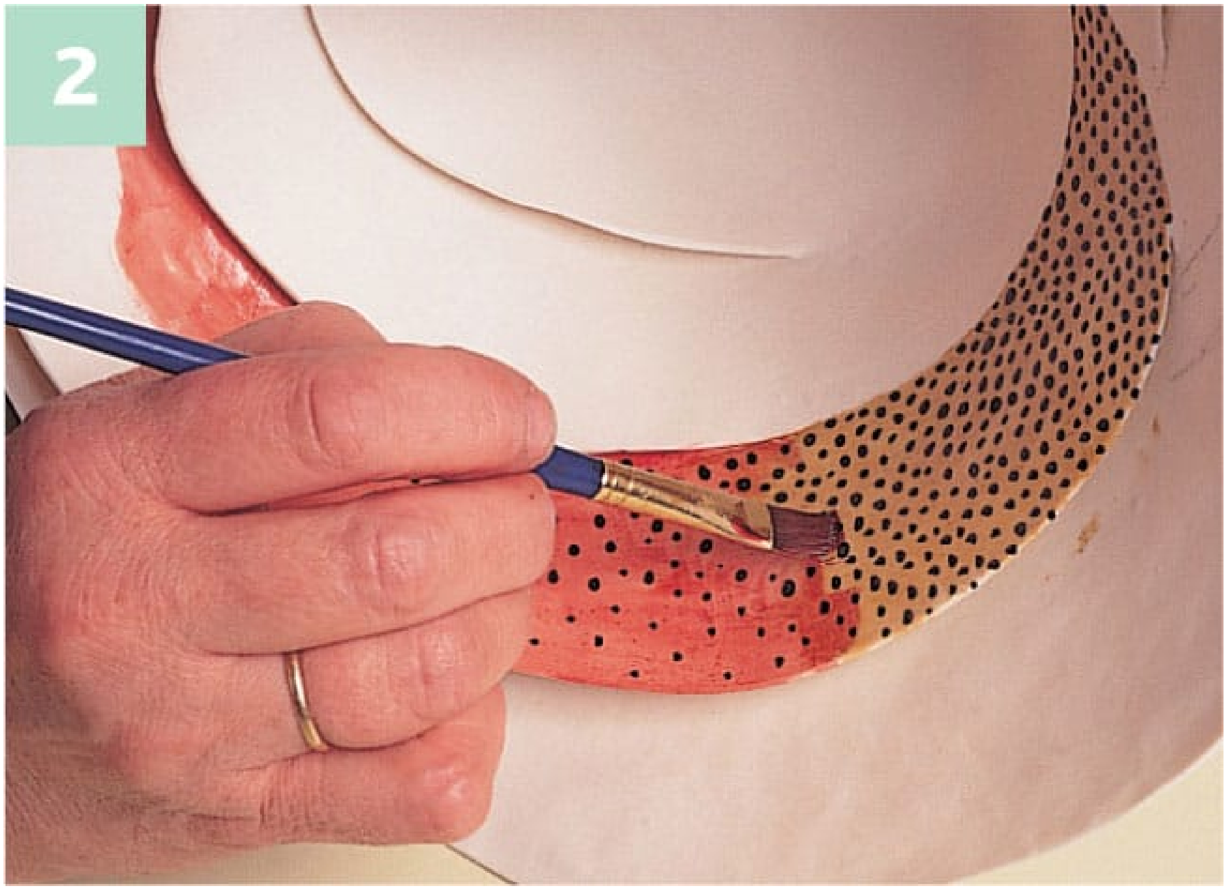
1 A crackle-glazed earthenware bowl fired to 1976°F (1080°C) with earthenware glaze is sprayed with luster.

2

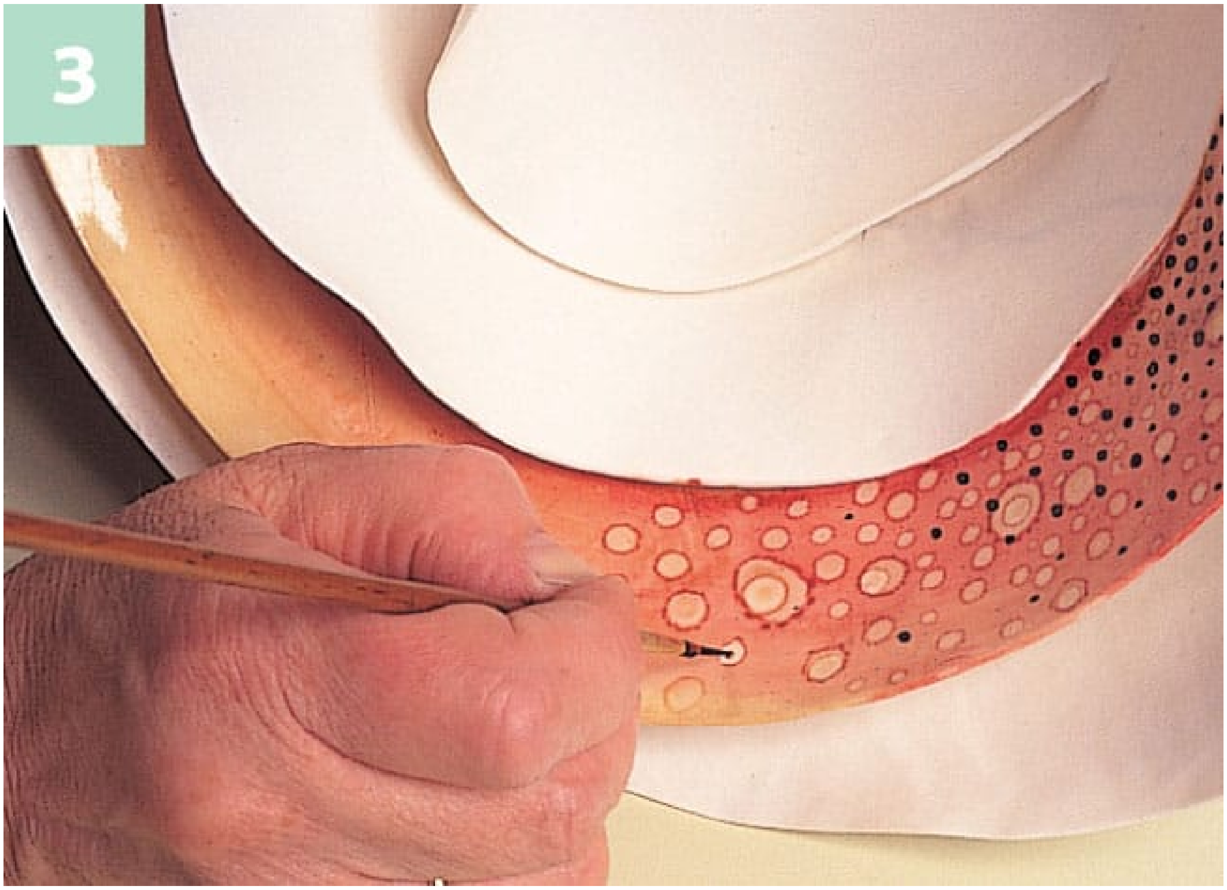
2 The bowl was fired again to 1256°F (680°C).

Painted luster on unglazed surface

1 The bowl is fired to 2246°F (1230°C) without glaze and rubbed down with fine-grade wet-and-dry carborundum paper.



2 A proprietary luster resist has been applied as small dots and allowed to dry before luster is painted on top.



3 More luster is applied to the ground color with a small brush, dipped first in luster and then in gasoline. This disperses the luster and gives a “bleeding” effect.

4

4 The completed bowl is fired to 1337°F (725°C). The color has changed completely during the firing, and without a glaze the luster has a definite and delicate metallic appearance.

Further Information

Using resists, pages 116–117
Painting glazes, pages 132–133
On-glaze enamels, pages 140–141

Stamping and sponging luster

Stamping is an intriguing way of applying luster to a glazed or unglazed surface. The example shown here uses a pencil eraser and a dense type of sponge similar to the synthetic rubber used in diving suits. There are cut to shape and mounted on a wooden “stalk” for easy handling. Colors can be blended or overlapped by stamping, and other methods of application can be combined with it. Resist methods can make use of luster resist, masking fluid, or designer’s gouache, and can be scrubbed off after firing.

YOU WILL NEED:
- Pre-fired work to decorate—tiles or handmade work, glazed or not
- Selection of lusters
- Sponge or pencil eraser to cut for stamps
- Scalpel or craft knife

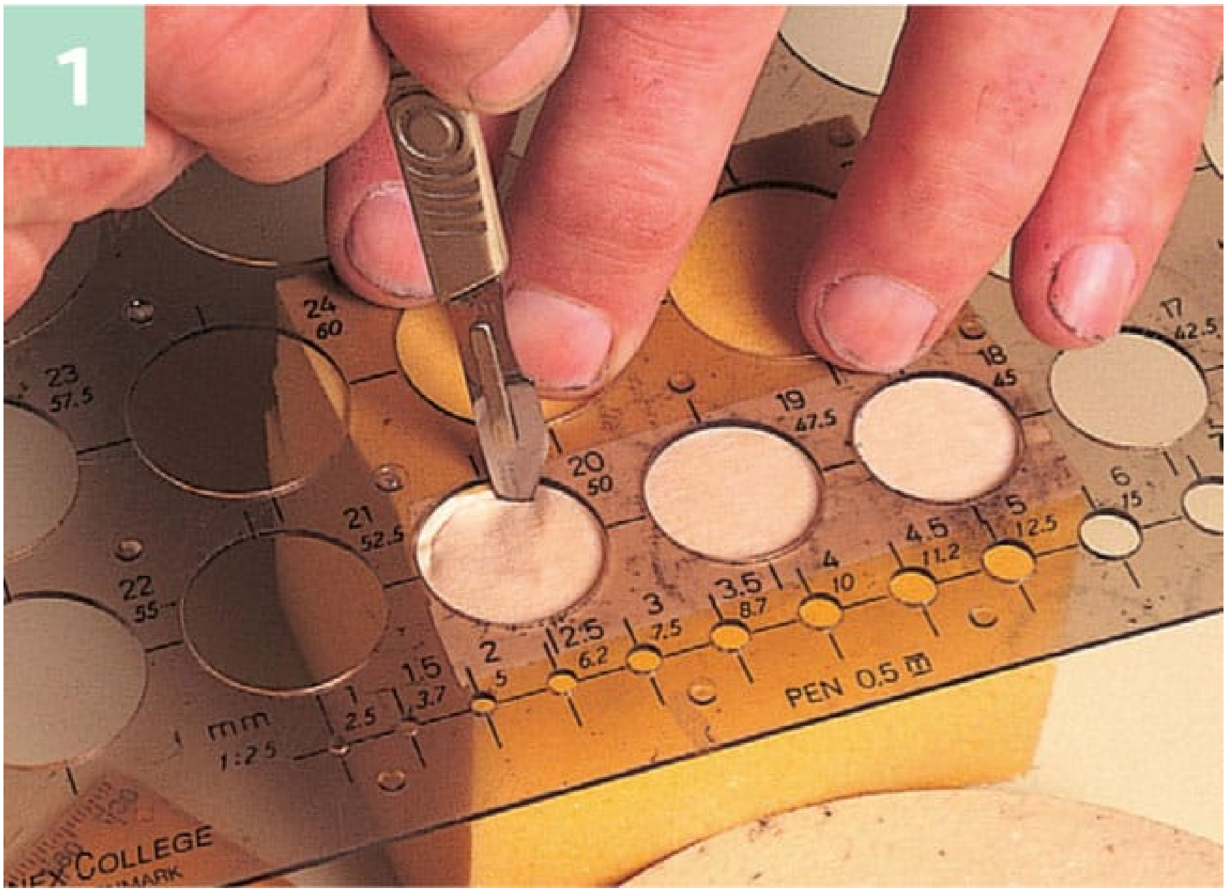
Stamped luster

1 Lusters are first poured onto a tile, which acts as a palette. Since they look similar, they will need to be labeled for identification.

2 A sponge is dipped into the luster until thinly coated, then stamped onto a white-glazed tile.

3 A pencil eraser is used to make a different kind of mark. The denseness of the rubber means that the luster is applied more thickly than with a sponge.

Sponged luster



1 A dense sponge is preferable for small, accurate stamps. Masking tape is stuck to the surface to make it more rigid, and a geometry instrument is used against which to brace the knife so that it cuts accurately into the sponge. The masking tape is then removed.

2 Copper platinum and mother-of-pearl lusters are stamped onto a satin-green-glazed stoneware dish.

The finished bowl
The bowl was originally fired to 2282°F (1250°C) after coating with manganese dioxide. After lusters were applied it was re-fired to 1436°F (780°C).

Further Information

Using resists, pages 116–117
Lusters, pages 142–143
Metal leaf, pages 146–147

Metal leaf

Using painted lusters (see page 142) is one way of adding a "precious touch" to a finished piece, but you can also use real metal leaf, which can usually be found in the catalogs of sculptors' and artists' suppliers. It is available as copper, silver, gold, or gold substitute. The leaf comes in books as loose leaf, or as transfer leaf with a paper backing. It is feather-light and disintegrates readily. The transfer leaf is easier to handle, though not suitable for all purposes. This sequence shows the use of gold transfer leaf on a fired raku piece.

Gold leaf needs no surface protection, though beeswax can be used to soften its brightness. Copper needs varnish to prevent tarnishing—good acrylic varnishes are suitable. Silver leaf can be patinated with potassium sulphide to give an aged effect. Metal leaf works best on textured surfaces, as it highlights the raised areas. The piece shown here is a raku-fired form with relief decoration.

Metal leaf
These examples show (left to right): gold and copper loose leaf; transfer silver leaf.

1 The surface must be prepared to accept the gold leaf with a special glue, known as gold size. This will be available from the suppliers of the metal leaf.

2 The gold leaf transfer is positioned, holding the overhanging transfer paper, and then rubbed with the fingers to make sure it adheres well.

3 The transfer paper peels off easily, leaving the gold in place. Gaps can be filled with extra gold leaf if required, but in this case the fragmented appearance adds character.

Gold leaf on textured surfaces
In both these press-molded pieces by Heather Morris, the leaf adheres to the raised areas, giving an extra dimension to the pattern. Right: a form in terracotta clay, fired to 2102°F (1150°C) before applying the gold leaf. Above: a raku-fired form with a similar textured surface.

Further Information

Press molding, pages 52–53
Lusters, pages 142–143
Raku firing, pages 178–179

Different glaze effects

The images on these pages show the exciting effects that can be created by hand painting glazes, especially in the case of majolica ware, and by combining glazes with other techniques such as sgraffito.

SGRAFFITO WITH GLAZES

The sgraffito method can be used with glazes as well as with slips. Jobb Heycamp's tall thrown vase has been decorated with several glazes. When dry the successive layers were randomly scraped away to reveal the underlying colors as the piece was slowly rotated on a banding wheel.

TRADITIONAL MAJOLICA

These are two fine examples of patterned majolica pottery. Slip cast in white earthenware clay, the pots were coated with transparent glaze before being hand-painted with patterned lines of lively color. Broad brushmarks are detailed with fine wavy lines of black pigment. This type of work is typical of handcrafted, mass-produced domestic pottery from the Italian majolica factories.

TIN-GLAZED EARTHENWARE

Daphne Carnegy used oxides and commercial stains applied over an earthenware tin glaze to produce the in-glaze majolica decoration of this bowl. Surface areas are defined by painted outlines in which color was applied by brushing and sponging methods.

EXPRESSIVE BRUSHWORK

In both these two examples, the artists have exploited the marks of the brush to create lively decorations. In the first, by Andrew McGarva, majolica has been applied to stoneware, using red iron and cobalt oxides painted onto the unfired glaze. The second, by Alan Caiger Smith, is standard tin-glazed earthenware, with skilled use of calligraphic brushwork.

Inventive Techniques

On these pages, we see some very sophisticated glaze techniques, including the use of overlaid glazes, resists, and luster decals. Most of these methods take a long period of experimentation to perfect.

STRONG COLORS

After bisque firing to 1830°F (1000°C), the base of this piece by Morgen Hall was masked with latex, and the pot was dipped into earthenware tin glaze. The slip has 7 percent cobalt oxide in it, which makes the color strong enough to show through the otherwise opaque glaze. The spoons were fired on metal stilts so they could be glazed all over. The pot and spoons were then glaze fired to 2084°F (1140°C).

OVERLAID GLAZES

The inventive decorative techniques of John Glick involve overlaying a number of different-colored glazes to which further color is added in the form of stains and oxides. This results in a rich surface filled with color and vitality.

FIGURATIVE DECORATION

Inese Brant's two slip-cast porcelain vases are the artist's comments on the popular fashions of her native Riga, capital city of Latvia. After an initial glaze firing to 2340°F (1289°C) in an electric kiln, figurative imagery was applied by a combination of on-glaze enamel painting and luster decals (transfers), which the artist silk-screen prints herself. These decals are of various views of the city, cut into the shapes of dresses and applied over the painted figures prior to firing at 1470°F (800°C). The vases stand on dark stoneware bases.

CRYSTALLINE GLAZES

Precise temperature control is required during glaze firing to allow crystalline glazes to develop their spectacular effects. The large crystals in this porcelain pot by Elsie Blumer were achieved by a sustained period of several hours "soaking" after the initial stoneware temperature had been allowed to drop to below 2012°F (1100°C).

CHAPTER 6

TECHNICAL RESOURCES

This chapter provides a wealth of essential information for the practicing potter, from glaze recipes to different types of kilns and firings, including those that can be done in the backyard. The chapter concludes with two pages on health and safety, which should not be ignored, followed by a useful glossary of pottery terms.

GLAZE AND SLIP RECIPIES

Unless stated otherwise the quantities of raw materials in the recipes are given as proportions of dry weight (not volume). So if a recipe states 4 parts china clay, you could decide that 1 part is equal to 1 lb (450 g) and therefore measure out 4 lb (1.8 kg) of china clay and 6 lb (2. kg) of ball clay. The basic weight unit will depend on the quantity of glaze you wish to produce and you will need to experiment to get this right.

Slips and engobes

Slip is liquid clay, used for decoration and for joining pieces. It is vital to apply slip to the wares before the clay pot has dried past the leather-hard stage because it must dry and shrink along with the clay it is applied to. If applied to a dry pot, it is more likely to crack as it dries and shrinks because the dry pot will already have shrunk.

It is also important to have the slip made up to the correct thickness for the decoration. Slip should be the consistency of light cream for pouring and dipping pots into, and thicker (more like heavy cream) for slip trailing. If slip is applied too thinly, the clay underneath will show through, but if it is applied too thickly it is more likely to crack. A slip should be made the day before it is required, so that it will settle overnight and the excess water separated on top can be removed. This top layer of water should always be removed before stirring, as it can then be added back to make the slip just the right thickness. Slips will settle to the bottom of the containers, so it is important to stir them repeatedly during use and to shake slip trailers to mix the slip.

Slips need to be stored in airtight containers otherwise the water content will evaporate, creating a thick skin on top. The insides of the containers should be wiped clean after use to prevent the splashes of slip on the container walls from drying and falling into the slip, making it lumpy.

Adding colorants to slip

To make your own colored slips you can add up to 5 percent metal oxide, or up to 15 percent of commercial colorants (approximately double the amount needed for colored glazes.) The percentage of metal oxide or commercial colorant needed to achieve the desired color will depend on the base slip, the glaze used, and the firing temperature, so it is essential to make and fire tests to achieve good results. Shown here are blue, green, and yellow slip.

Unglazed slip decoration

Many pigments can be applied to clay at the raw or bisque stage and do not need glazing. Oxides, underglaze colors, and vitreous slips (known as engobes) make pleasing surface finishes without the need for a glaze—when shine is not required, when the piece is not for food use, or when a glaze covering might spoil delicate detail or texture, for example.

White stoneware engobe

Flint	10
Potash feldspar	10
China clay	10
Ball clay	5
Nepheline Syenite	5

Earthenware engobe

China clay	50
Ball clay	50
Borax Frit	50

(+ stain to required strength)

Thanks to Jude Jelfs

Slip glazes

Slip glazes, with a high clay content, are part slip and part glaze. They can be applied at the leather-hard or dry stage, and can be fired straight through without an interim bisque firing. Below are two useful slip glaze recipes:

Metallic stain black

Oxidized or reduced 2282°F (1250°C)

Potash feldspar	40
Red clay	40
Manganese dioxide	20

Iron slip glaze

Oxidized or reduced 2282°F (1250°C)

Red clay	45
Borax frit	30
Nepheline syenite	10
Talc	10
Red iron oxide	5

Metallic oxides

Metallic oxides can be applied to slip individually or as mixtures. Here are some recipes for combinations of pigments that give matte results, or a slight sheen, at earthenware or stoneware temperatures:

Bronze

(attractive gold/bronze, but can be runny)

Manganese dioxide	80
Copper oxide	20

Black

Red iron oxide	40
Manganese dioxide	20

Cobalt oxide	10

Rust

Red iron oxide	65
Red clay	35

Brownish blue

Red clay	92
Cobalt oxide	8

Dull green

Ball clay	75
Borax frit	20
Chromium dioxide	5

Further Information

Making slip, page 33
Slip decoration, pages 100–101
Slip trailing, pages 106–107

Glazes and coloring oxides

Glaze is made of three basic elements: silica, alumina, and a flux. Silica forms the glass, while alumina gives the clay some “body” and stability, helping to create an effective surface coating. Flux controls the melting temperature of the glaze. The combination of materials will affect the appearance of the glaze and control the temperature at which it needs to be fired to reach its maturation point. The following is a list of materials commonly used in glaze formulation with various firing conditions and in different mixtures.

Red iron oxide

Glaze materials

Alkaline frit is a combination of sodium, potassium, and silica. Alkaline frits are used for crackle glazes.

Alumina acts as a stabilizer and increases the viscosity of a glaze.

Ball clay contains both alumina and silica.

Barium carbonate is used as a secondary flux at stoneware temperature and produces matte or semi-matte surfaces at earthenware temperatures.

Bentonite helps to suspend the particles of glaze powder solution when added in quantities of up to 3 percent.

Borax frit is a powerful flux at earthenware temperatures. Borax is a good alternative for lead, when a leadless glaze is required. Small amounts of borax can be added to stoneware glazes to lower their melting point.

China clay contains alumina and silica. It can be used to make a shiny glaze matte. It is highly refractory and can also be used to raise the maturation point of a glaze.

China clay

Coloring oxides

Metal oxides can be purchased from suppliers in varying quantities, some being much more expensive than others.

When added to glazes in small percentages, they yield a wide range of colors. Small amounts of around 1 percent will give pale colors while up to

10 percent will give strong, intense colors, depending on the oxide. Never add more than 10 percent, because this can cause the glaze to bubble and erupt, giving an unpleasant volcano-like surface that can be sharp to the touch.

The oxides mentioned below are the most commonly available; your supplier can give you a full list of all the oxides available and a description of their resulting effects.

Iron oxide (1–10 percent) In earthenware glazes, this makes colors from pale straw to rich rust, while in stoneware glazes it can give rich browns to black.

Manganese dioxide (1–8 percent) In both earthenware and stoneware, this gives a purple-brown color. If tin oxide is also present, the colors will range from pink to bright purple.

Colemenite (calcium borate or borocalcite) is a strong flux at earthenware temperatures. It can also be used as a flux in stoneware glazes. It intensifies colors produced by oxides.

Dolomite is a source of calcium and magnesium, and promotes matte effects in stoneware glazes. It is also an opacifier, which by itself has a distinctly oatmeal appearance.

Feldspar always contains silica, alumina, and fluxes. It is commonly used in stoneware glazes. When a recipe states “feldspar,” feldspar-potash should be used. Feldspar-soda contains more soda than potash and has a lower melting point. Nepheline syenite is a form of feldspar that contains more soda and potash than silica. It is used where a low maturation point is required. Cornish stone is a feldspar with a higher silica content, causing it to melt at a higher temperature than other feldspars. Ilmenite is used in small amounts with rutile to give textured glazes. It can also be used as a coloring pigment in stoneware glazes.

Lead is used in its fritted form of lead bisilicate or lead sesquillicate. It is a powerful flux. Lead glazes produce rich colors when used with coloring oxides. Do not use copper colorants in lead glazes on pottery intended for food and drink, as these increase the amount of lead released from the glaze.

Copper carbonate

Copper oxide (1–5 percent) Copper ranges from turquoise to green in oxidation and copper reds in reduction. At earthenware temperatures it can become unstable when added to low-solubility lead glazes, and is unsuitable for functional ware.

Copper carbonate (2–10 percent) Similar color range to copper oxide.

Cobalt oxide (0.5–2 percent) This produces a range of blues in most glazes. This is a strong oxide, and too much in your glaze can lead to blistering. The color intensifies as the temperature increases

Titanium dioxide (5–15 percent) Titanium produces a creamy color and is often used to create crystalline glazes.

Magnesium carbonate is a high-temperature flux. When used in amounts of up to 10 percent, it aids production of satin matte glaze surfaces.

Silica (flint and quartz) is the essential glass-forming ingredient in all glazes. It is found naturally in clays and wood ash and is available in the forms of flint and quartz. Both are used to introduce silica into glazes, raising the melting point and inhibiting crazing.

Talc (French chalk) is high in magnesium content and helps to make a matte surface in stoneware glazes

Whiting (limestone) is used as a flux when introduced in small quantities. In amounts over 25 percent, it promotes matte effects in the glaze.

Zinc oxide is used as a secondary flux in quantities of up to 5 percent. Used in amounts of over 10 percent, it produces a matte surface and is a useful opacifier.

"Lime green" glaze stain

Tin oxide (2–10 percent) Tin acts as an opacifier, producing the best white glazes. Ideal for earthenware majolica glazes.

Zirconium oxide (5–15 percent) This produces opaque white glazes, slightly milkier than tin will produce.

Glaze stains

Prepared ceramic stains are oxide-based blends mixed with stabilizing materials, fired and then ground for use in powder form. They permit a predictable range of colors as an alternative to oxides. They can also be mixed with oxides, either for painting or as an addition to glaze or slip, adding extra stability and color to the more textural quality of oxides.

Further Information

Applying glazes, pages 130–131
Painting glazes, pages 132–133
Crystalline glazes, pages 138–139

Earthenware glaze recipes

Glazes falling into the 1760–2080°F (960–1140°C) temperature range are classified as earthenware and usually incorporate commercially fritted compounds, rendering lead safe to handle. Fritted lead and additions of copper oxide to lead should be used with caution on functional vessels.

Earthenware glazes

Transparent glaze

1940–1980°F (1060–1080°C)

Lead sesquisillicate	22 lb (10 kg)
China clay	5 lb (2.5 kg)
Flint	3 lb (1.3 kg)

Adding a teaspoon of calcium chloride (or a water softener such as Calgon) will prevent the glaze from settling in the container. This is a good all-round glaze, suitable for slip-decorated ware and as a base for colored transparent glazes. You can add oxides to color it. Add 4 percent iron oxide for golden orange; 1 percent cobalt oxide for strong blue; or 2.5 percent copper oxide for bottle green.

This lidded jar by Bryan Trueman was coated with a ball-clay-based slip and glazed with a transparent earthenware glaze.

Although earthenware glaze is usually fired only at earthenware temperatures, it can produce interesting effects when fired to higher temperatures with stoneware glazes. Here, a transparent earthenware glaze has been overlaid with turquoise matte stoneware glaze, which seems to float on the shimmering low-temperature earthenware glaze.

Honey glaze

1940–1980°F (1060–1080°C)

Lead sesquisillicate	6 lb (3 kg)

Powdered red clay	2 lb (1 kg)

This works well over white slip on red clay pots. Try to use the same powdered red clay as the clay body of the wares to ensure a good glaze fit. It is excellent on bisque ware, and by adding a small amount of bentonite, will work well as a raw glaze.

Tin glaze

1980–2050°F (1080–1120°C)

Lead bisilicate	26
Borax frit	7
Ball clay	6
China clay	4
Tin oxide	3
Bentonite	1

This produces a good, stable, white tin glaze that is ideal for red clay and majolica work. Where the glaze runs thin, it breaks over throwing lines to reveal a rich red color.

This is a classic piece of earthenware pottery by Morgen Hall. Areas of cobalt blue were painted over stencils applied to the opaque tin glaze. Areas of thinner glaze reveal the richness of the terracotta clay breaking through the surface.

Further Information

Glazes and coloring oxides, pages 156–159
Packing and firing, pages 172–175

Raku, stoneware, and porcelain glaze recipes

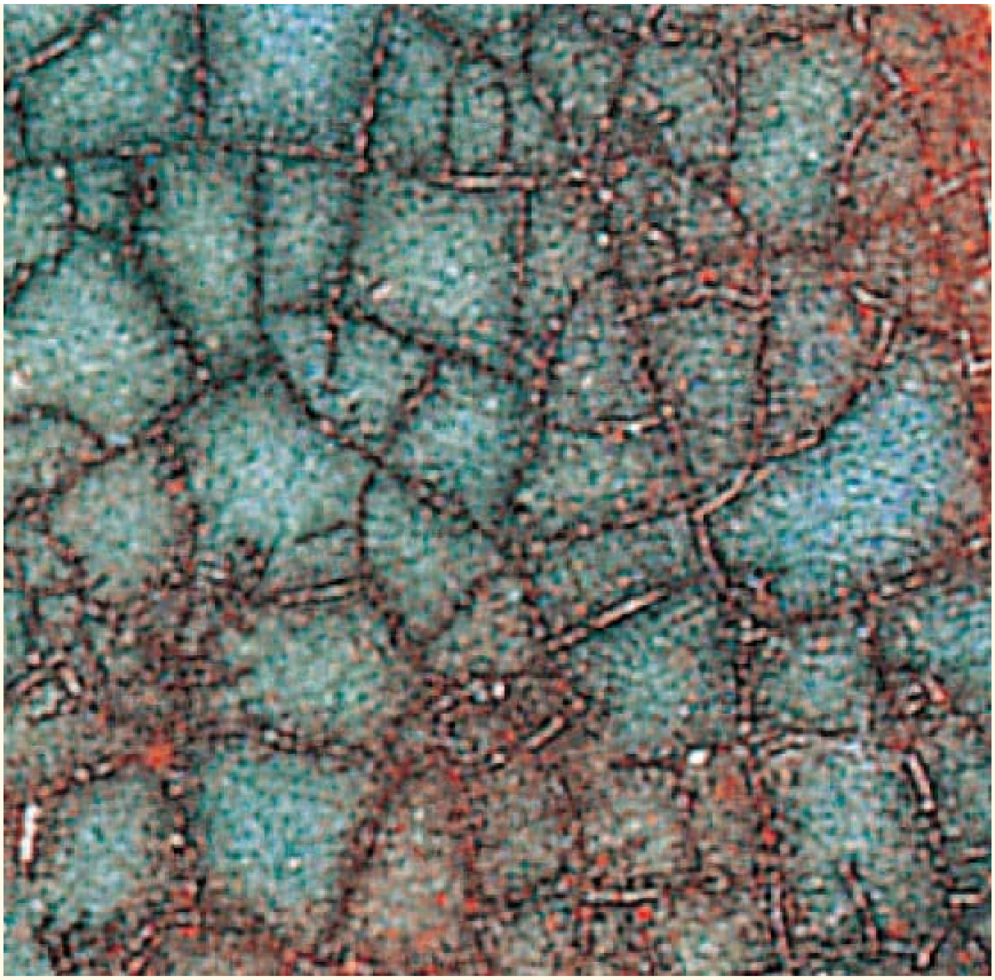
Raku glazes have to melt at very low temperatures and become smooth and glassy during the extremely short firing cycle. Consequently, they are all frit-based. Even when using a pyrometer to indicate the temperature (see page 186) you will still need to judge by eye how even the glaze melt is.

Raku glazes

Soft clear glaze
1830°F (1000°C)

Borax frit	60
Calcium borax frit	40
China clay	10
Bentonite	10

Add 7 parts tin oxide to produce a good white crackle glaze.



Turquoise luster glaze with smoked crazing. Areas of copper red appear where reduced heavily.

Turquoise luster glaze
1830°F (1000°C)

High-alkaline frit	50
Borax frit	20
Copper oxide	4
Bentonite	3

Produces a good turquoise where thick, with copper red luster where heavily reduced in sawdust.

Copper matte glaze
1740–1830°F (950–1000°C)

Copper oxide	95
Alkaline frit	5

Produces the entire range of lusters when reduced.

Stoneware and porcelain glazes

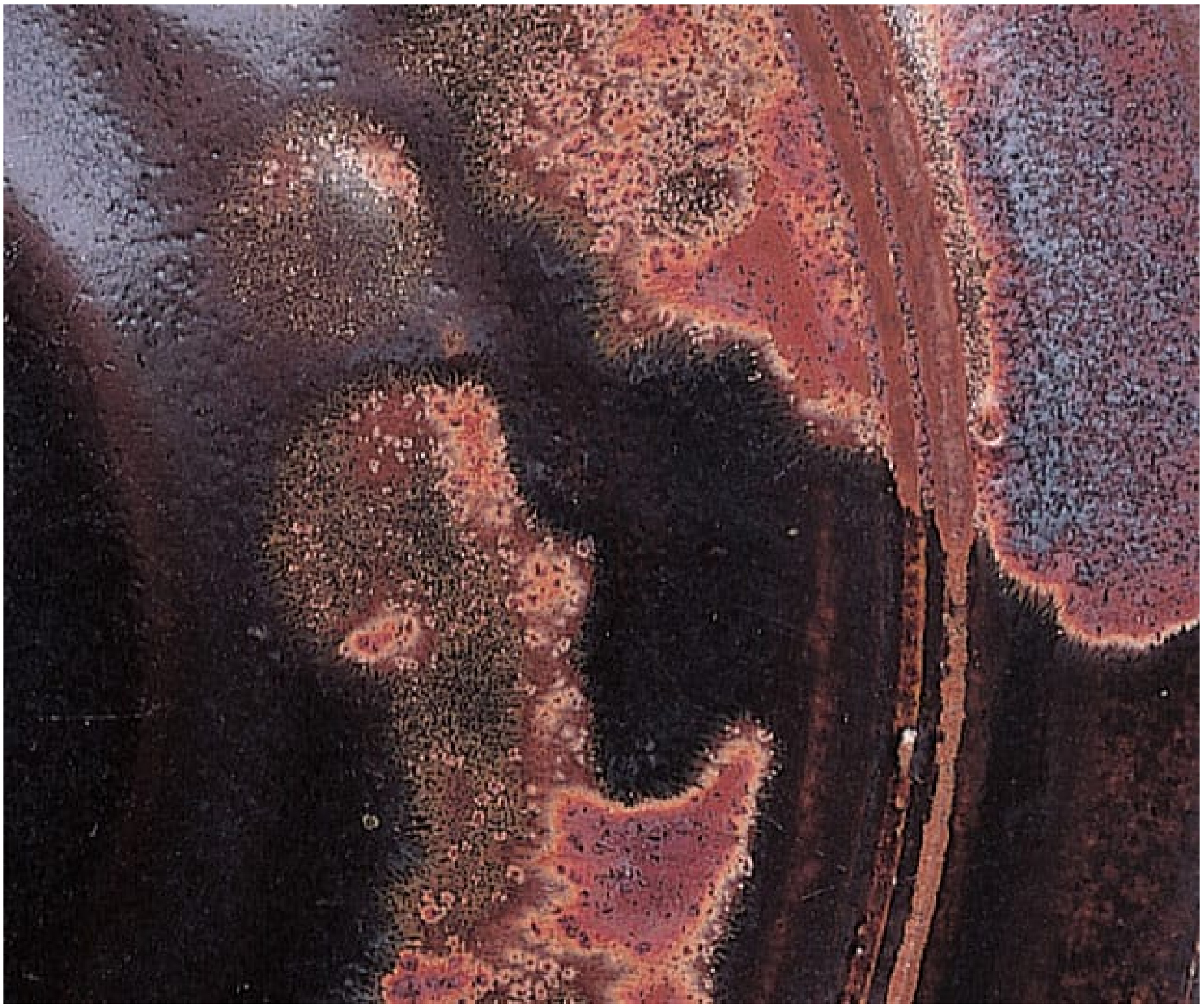
Glazes fired over 2190°F (1200°C) are usually classified as stoneware glazes. At these temperatures, the clay actually fuses to the glaze and becomes integral. Most stoneware glazes will work on either porcelain or stoneware, but with different finishes. The large variation in stoneware clay bodies will also produce different results. Always test these glazes to see if they are suitable for a particular clay, temperature, and type of firing, whether reduction or oxidized.

Celadon glaze
2300–2340°F (1260–1280°C)

Feldspar	40
Flint	30
Whiting	20
China clay	10
Talc	5

Red iron oxide	1

A classic glaze for porcelain. This glaze gives a good subtle blue over white-firing clay bodies.



Tenmoku with iron decoration
Red iron oxide has been splashed across the tenmoku base before firing.

Turquoise matte glaze
2300°F (1260°C)

Feldspar	50

Barium carbonate	20
Ball clay	10
Whiting	9
Zinc oxide	8
Copper carbonate	3
Titanium dioxide	2
Cobalt carbonate	0.5

A deep, matte, turquoise glaze where applied thickly. Becomes semi-matte when fired to 2370°F (1300°C). Produces subtle copper reds and pinks in reduction.

Dolomite white glaze

Feldspar	64
Dolomite	13
Whiting	13
China clay	12
Tin oxide	5

A stiff, matte, white glaze. Fires well in oxidization or reduction.

Tenmoku glaze
2340°F (1280°C) reduction

Feldspar	62

Flint	19
Whiting	10
Ball clay	9
Red iron oxide	8

A typical tenmoku glaze giving a good, dark black, breaking to rust over the edges.

Further Information

Glazes and coloring oxides, pages 156–159
Packing and firing, pages 172–175

Macrocrystalline glaze recipes

Crystalline glazes need a pure white and smooth body so that no inherent impurities or surface coarseness can create seeding for the crystals and spoil the finished piece. Porcelain is therefore the traditionally preferred body, although a smooth white stoneware can be almost as successful. Any method of manufacture can be used in the creation of pots for crystalline glazes, provided the surface is smoothed off, either when it is bone-dry, or with carborundum paper after bisque firing. Uncomplicated forms such as bottles and bowls are especially suitable. See pages 138–139 for the effect of these glazes.

Firing crystalline glazes requires an oxidizing atmosphere, because reduction inhibits the crystal growth. A programmed electric kiln is the best choice, because the schedule is fairly complex. The peak firing temperature is between 2300°F and 2372°F (1260–1300°C)—the final 392°F (200°C) being completed rapidly in order to make the glaze fluid as quickly as possible. Having attained its peak, the temperature is reduced as fast as possible by 392°F (200°C). This takes it down to the crystal growth band, which is between approximately 2012°F and 1787°F (1100–975°C). The pots are soaked within this temperature band for three to eight hours to allow crystals to grow and develop in the glassy matrix.

A post-firing reduction can be done on glazes containing copper to create bright copper luster crystals. Select finished pots from the oxidation firing and place them in a gas-fired kiln. Take the temperature up to 1517°F (825°C). A reducing atmosphere is induced while the temperature drops to 1022°F (550°C) over a 90-minute period. Allow the kiln to cool naturally.

Crystalline glaze

for oxidized firing at 2300°F (1260°C)

Ferro frit 3110	44
Calcined zinc oxide	27
Flint	21

Titanium dioxide	8
+ Calcined alumina	0.5
+ Molochite	0.5
+ Finnfix *	0.2

*A glaze adhesive/hardener. Gum arabic or gum tragacanth can be used instead.

This glaze will produce white crystals on a white background. The real joy starts when coloring oxides are added. Best results generally come from using two or even three oxides or carbonates in the same glaze. Opposite are some suggestions for additions of oxides:

The success of this macrocrystalline glazed bottle by Peter Ilsley depends on a combination of factors: glaze formulation, glaze application, and firing schedule.

Apple-green crystals on a white background:

Add: 2 percent Copper carbonate
1 percent Manganese dioxide

Violet crystals on a gray background:

Add: 0.5 percent Cobalt carbonate
2 percent Manganese dioxide

Gold crystals on a green ground:

Add: 2 percent Copper carbonate
3 percent Manganese dioxide

Prussian blue crystals on a tan background:

Add: 0.2 percent Cobalt carbonate
0.5 percent Copper carbonate
0.5 percent Nickel oxide

Turquoise crystals on a tan background:

Add: 0.5 percent Copper carbonate
0.5 percent Nickel oxide
0.5 percent Red iron oxide

Ivory crystals on a white background:

Add: 1.5 percent Red iron oxide

Further Information

Textured glaze recipes

Glaze can be altered in various ways to provide texture. Technically speaking, texture can be considered as a glaze fault, but it does have its place, especially in more sculptural ceramics, so here are a few ways of creating it in a stoneware glaze.

Crawled glazes

Crawling is a fault often caused by applying glaze too thickly, or to a surface that is dusty or greasy. The glaze pulls away into bunches and does not flow properly across the surface. A glaze with high viscosity tends to crawl. A controlled crawl can be created by experimenting with additions of tin or zinc oxide, or zirconium silicate.

White crawled glaze
2156°F (1180°C)

Regular transparent earthenware glaze	50
Tin oxide	50

White crawled glaze
oxidized or reduced 2300°F (1260°C)

Zinc oxide	50
Nepheline syenite	50

Yellow/brown crawled glaze

Tin oxide	50
Regular tenmoku glaze (see page 163)	50

Barium glaze
2156°F (1180°C)
Gives a peeling effect when over-dipped with the above crawl glaze.

Nepheline syenite	50
Barium carbonate	34
China clay	16
+ Copper carbonate (gives turquoise/blue)	3

Textured sphere
Texture is entirely appropriate for this sculptural sphere by Annette Bridges. It was pierced before firing and glazed with crawled glaze over a thin barium glaze, creating a "peeled" effect.

Volcanic glaze
2282°F (1250°C) apply thickly

Potash feldspar	38
China clay	21
Flint	11

Titanium dioxide	6
Talc	3
+ Silicon carbide (+ color as required)	2

Crackle glazes

Cracked or crazed effects are caused by different expansion coefficients between the clay body and the glaze. Low-temperature glazes are often inclined to crackle. Crackle may develop over a period of time and can be accentuated by soaking in tea, fabric dye, or India ink, or by rubbing a dark oxide into the crackle and re-firing. At high temperatures, crackle can be induced by reducing the silica content of a glaze, or by adding oxides that have a high coefficient of expansion, such as sodium and potassium.

Crackle glaze
Stoneware bowl by Andrew Matheson, reduction fired with a crackle glaze to produce a marbled effect.

Volcanic glazes

These crusty glazes can be produced by adding silicon carbide to a stoneware glaze. This gives off carbon during firing and causes bubbling. Other combustible materials, such as coarse wood ash, can have a similar effect.

Stained volcanic glaze
For this candlestick by Paul Young, volcanic glaze was applied, with the addition of 2 percent green glaze stain. Local reduction caused the green color to change to pinkish brown.

White crackle

2300°F (1260°C) oxidized

Cornish stone	49
Dolomite	25

China clay	18
Flint	8

White crackle
2336°F (1280°C) reduced

Apply thickly to produce a large crackle pattern.
Rub in Indian ink to increase the effect.

Potash feldspar	83
Whiting	9
Flint	8
+Bentonite (to aid suspension)	2

Further Information

Glazes and coloring oxides, pages 156–159

Kilns

Before any clay object can become truly ceramic, it must be fired in a kiln, which is the most fascinating part of the process for any potter. Whatever way you choose to fire your work, there is always a feeling of excitement and uncertainty when opening a kiln. Extreme temperatures will have transformed the raw clay into a permanent artefact, an enduring personal mark of the artist.

In any kiln, the principle is to supply enough heat over a specific length of time to create chemical and physical changes in the clay body and glazes. Modern kilns have temperature gauges, pyrometric cones, and even computer controllers to manage and monitor the firing, but there is still a degree of unpredictability, as differences occur depending on the type of fuel used and the atmosphere created within the kiln.

Electric and gas kilns

Electricity offers the most controllable and straightforward way of firing. Electric kilns are clean, efficient, have automatic temperature controllers, and can be used in cities and built-up areas where smoke emission may be a problem. Electric kilns transfer heat by radiation from the elements, always fire in an oxidizing atmosphere, and no oxygen is needed for combustion of fuel. They are usually constructed from brick in a metal casing. In recent years, ceramic-fibre technology has revolutionized kiln efficiency. Always investigate the efficiency of any kiln you intend to buy—the more fiber used in its construction, the better.

Eye protection
Looking through a spyhole when the kiln has reached a high temperature can damage your eyes, and the glare from the kiln usually makes it impossible to view the pyrometric cones inside that indicate the temperature of the kiln. View the cones through a piece of green glass, a special cone viewer, or best of all protective goggles. Shine a flashlight into the glare as you look through the goggles to make the cones stand out as dark shadows.

Front-loading electric kilns

This type of kiln has a more solid metal framework and thicker walls than a top loader (below), which means it retains heat for longer. It is also more expensive to buy and install, but is harder wearing. Front loaders are heavy, so you will need to think carefully about how to maneuver the kiln into position.

Top-loading electric kilns
Top-loading kilns are convenient for small-scale workshops because they are cheaper to buy and easier to install. Some potters feel that top loaders cool too rapidly, having a detrimental effect on their work. Others consider this an advantage because they are able to have a very quick firing cycle.

Mobile kilns

Small mobile kilns fuelled by bottled propane gas have become popular with studio potters and beginners alike. A whole range of firings can be achieved, from low-temperature raku and luster firings to high-temperature stoneware and porcelain. Larger kilns may also be fuelled by natural or town gas. Oil kilns can be fuelled by diesel oil from automobiles or domestic heating oil. Gas and oil kilns allow a greater variation of effects on the clay and glazes than electric kilns because a smoky atmosphere (known as reduction) can be created by decreasing the amount of oxygen present in the kiln chamber.

Further Information

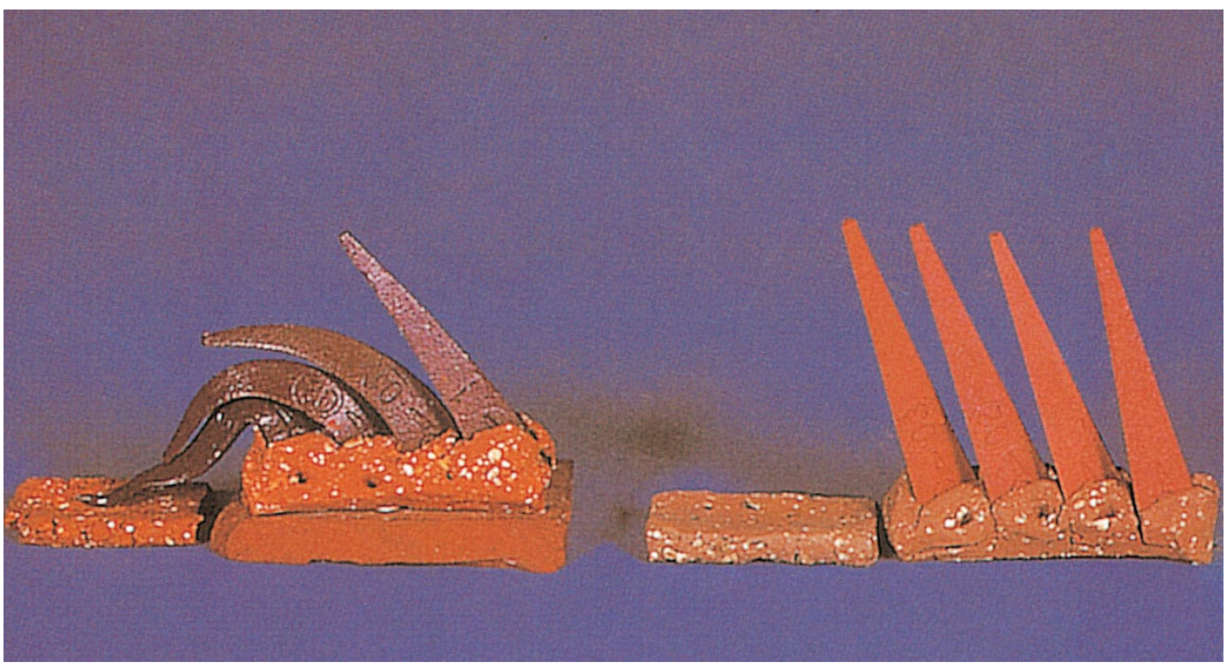
Packing and firing, pages 172–175
Saggar and pit firing, pages 176–177
Raku firing, pages 178–179

Kiln temperature

The most important factor for a successful firing is the control of the temperature. Traditionally, this was done by eye, judging the temperature at a given point by the color within the kiln. Many potters still fire in this way, but it can be inaccurate, especially for inexperienced potters. The best method of measuring the temperature is to use pyrometric cones.

Pyrometric cones

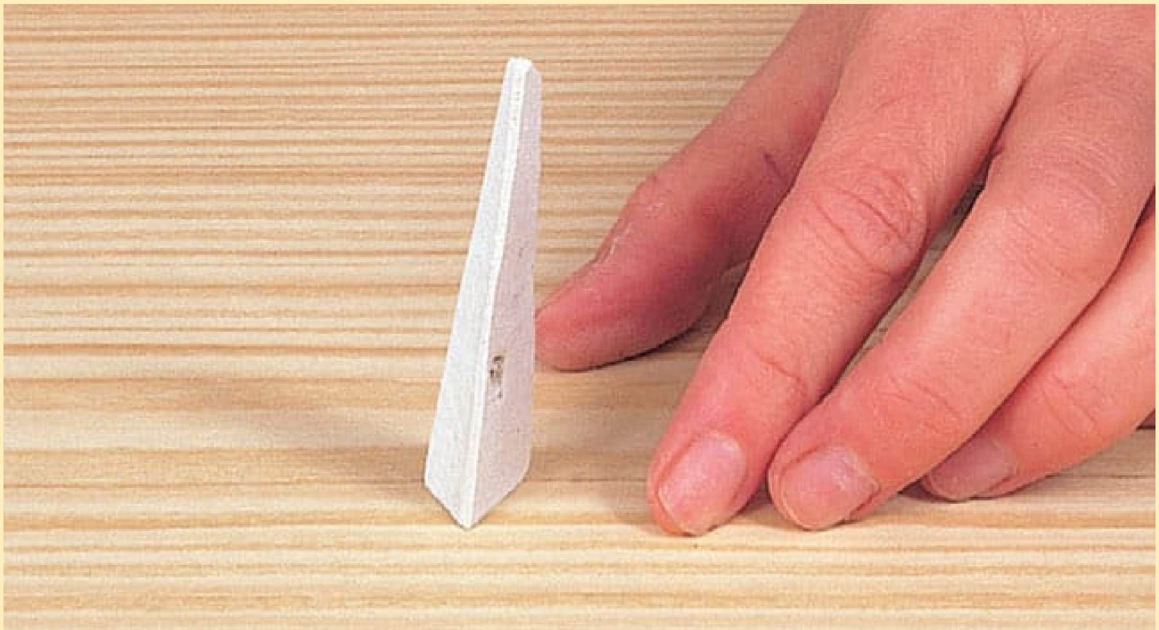
These are composed of ceramic materials pressed into shape, and formulated to melt at specific temperatures indicated by a number on the side. Be careful because different manufacturers' cones may vary slightly in the temperatures at which they melt. Always try to use the same make of cone so that you can fire time after time with confidence. To mature successfully, clay and glaze depend not only on temperature but also length of time.



Positioning the cones

It is useful to place three cones in the kiln for each firing, as follows: a cone that melts just below the temperature you require; one that melts at the temperature you require; and one that melts just above the temperature you require. Doing this will give you an early warning that your kiln is about to reach the desired firing temperature; an indication that the temperature has been achieved and you must switch the kiln off; and evidence to show if the kiln has over-fired. You must position the cones in such a way that they do not melt onto one another. Stand them in a slanting line, beginning with the cone that will melt first.

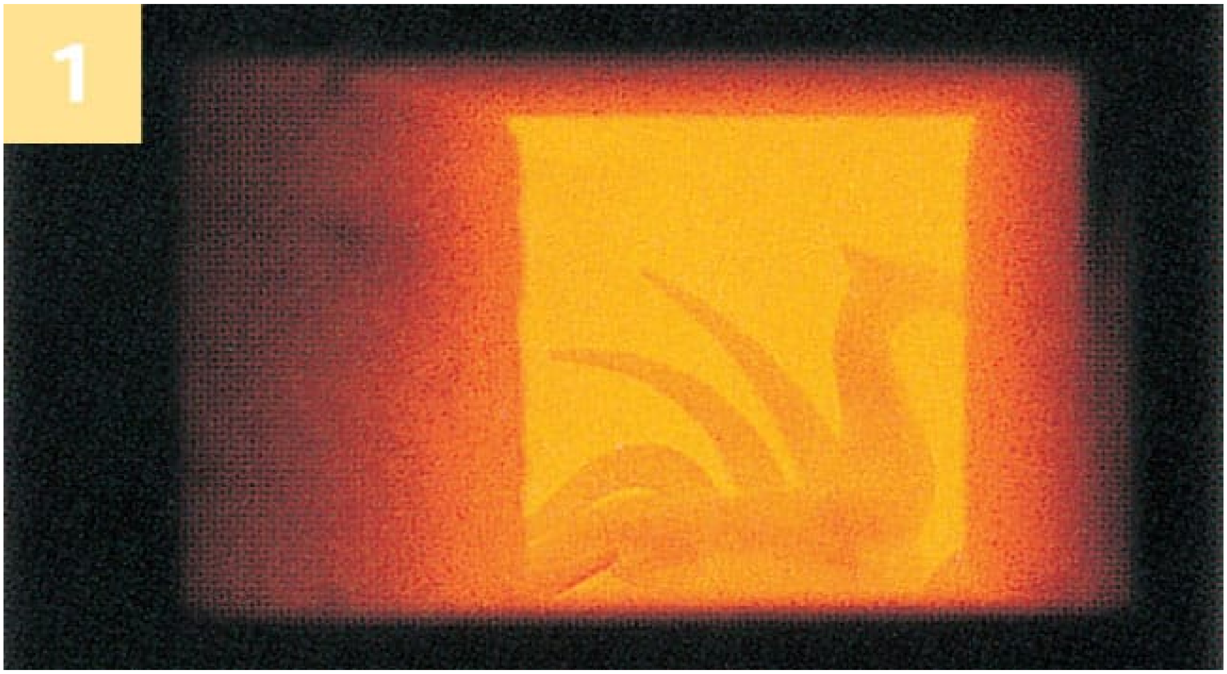
Standing the cones



You must start with the cone standing in the correct position. You can buy a cone stand, but the simplest method is to wrap a coil of clay around the base. Stand the cone on a table or shelf, so that the base of the cone is fully in contact with the flat surface. The cone does not stand completely upright but is slanting. This is its correct position.

Roll a small coil of clay, and wrap it snugly around the base of the cone. Hold the cone on the table as you do this, to maintain its correct slanting position. A narrow wall is sufficient to support the cone, so remove any excess. Your cone is now ready to go into the kiln.

Using pyrometric cones



1 By looking through the spyhole into the kiln, you can clearly see the cones bending. Here, cones 8, 9, and 10 are placed in order from left to right. Cone 8 (2300°F/1260°C) has already completely bent over, cone 9 (2340°F/1280°C) is halfway down, and cone 10 (2370°F/1300°C) is beginning to follow. When cone 10 is fully down, the firing will be stopped.

2 It is always useful to keep cones from successful firings to act as a guide for future firings. The two sets of cones on the right, from a successful firing, have fully melted. The dark cone 4 (1940°F/1060°C) denotes a period of reduction and is totally molten. Cones 8 and 9 have also melted, denoting a final kiln temperature of around 2340°F (1280°C). These two sets were placed at the top and bottom of the kiln and show an even firing. The cones on the left are under-fired, due to a cool spot in the kiln.

Further Information

Kilns, pages 168–169
Packing and firing, pages 172–175
Saggar and pit firing, pages 176–177

Packing and firing

All potters develop their own firing patterns, and there are no hard and fast rules. The main thing is to monitor the firing continually and keep accurate charts and kiln logs so that you can compare results from consecutive firings.

Kiln firing is a slow learning curve, with many frustrations, but with perserverance it will be an exciting and enjoyable experience.

A whole range of kiln furniture is available depending on the work you have made and the firing temperature.

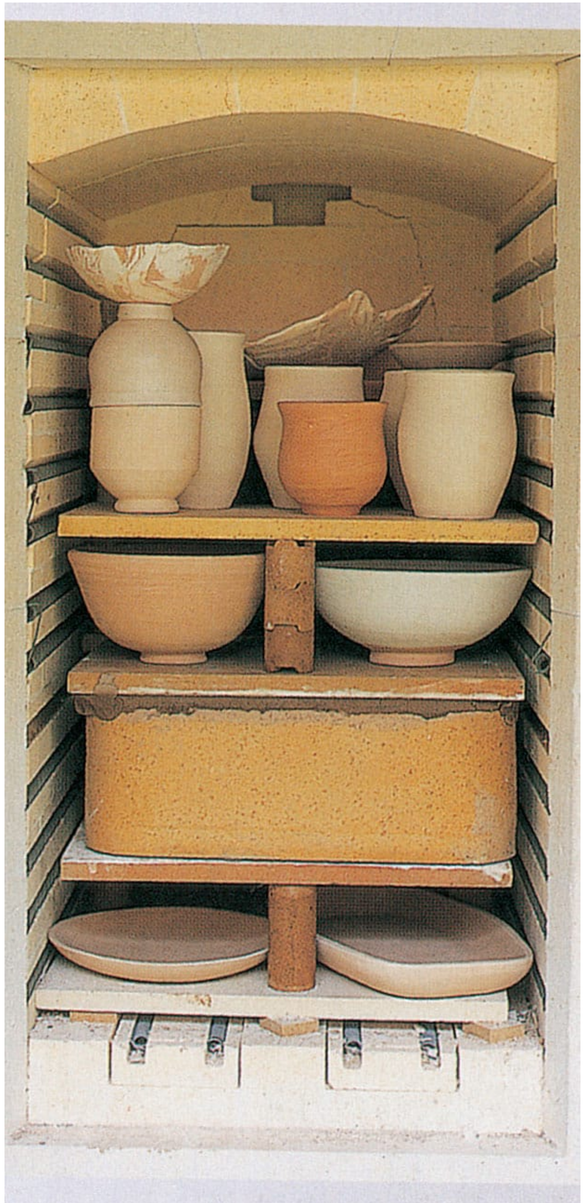
Kiln furniture

Kilns are packed using shelves and props. Try to pack heavier pots at the bottom, and lighter ones on higher shelves. The shelves are separated by the props, evenly spaced at the edges of the shelf. Always use three props per shelf. The props must be placed one above the other on each consecutive layer of shelves.

During high-temperature firings, small blobs of glaze can often drip onto shelves. A protective coating of "bat wash" can be obtained from suppliers; when mixed with water, this is painted onto the shelves. You can make your own from a mix of two parts alumina and one part china clay. This coating can be renewed as needed.

Tubular props are available in different heights and shapes. The heights can be altered by stacking them. Triangular “star stilts” are used to raise pots above the shelf, usually if your pots are glazed underneath. The points break off, allowing the pots to be removed. The sharp scars in the glaze must be ground down.

Packing a kiln for a bisque firing
Some of the work is stacked on top of each other for economy of space. The series of bowls at top left are stacked rim to rim and base to base.

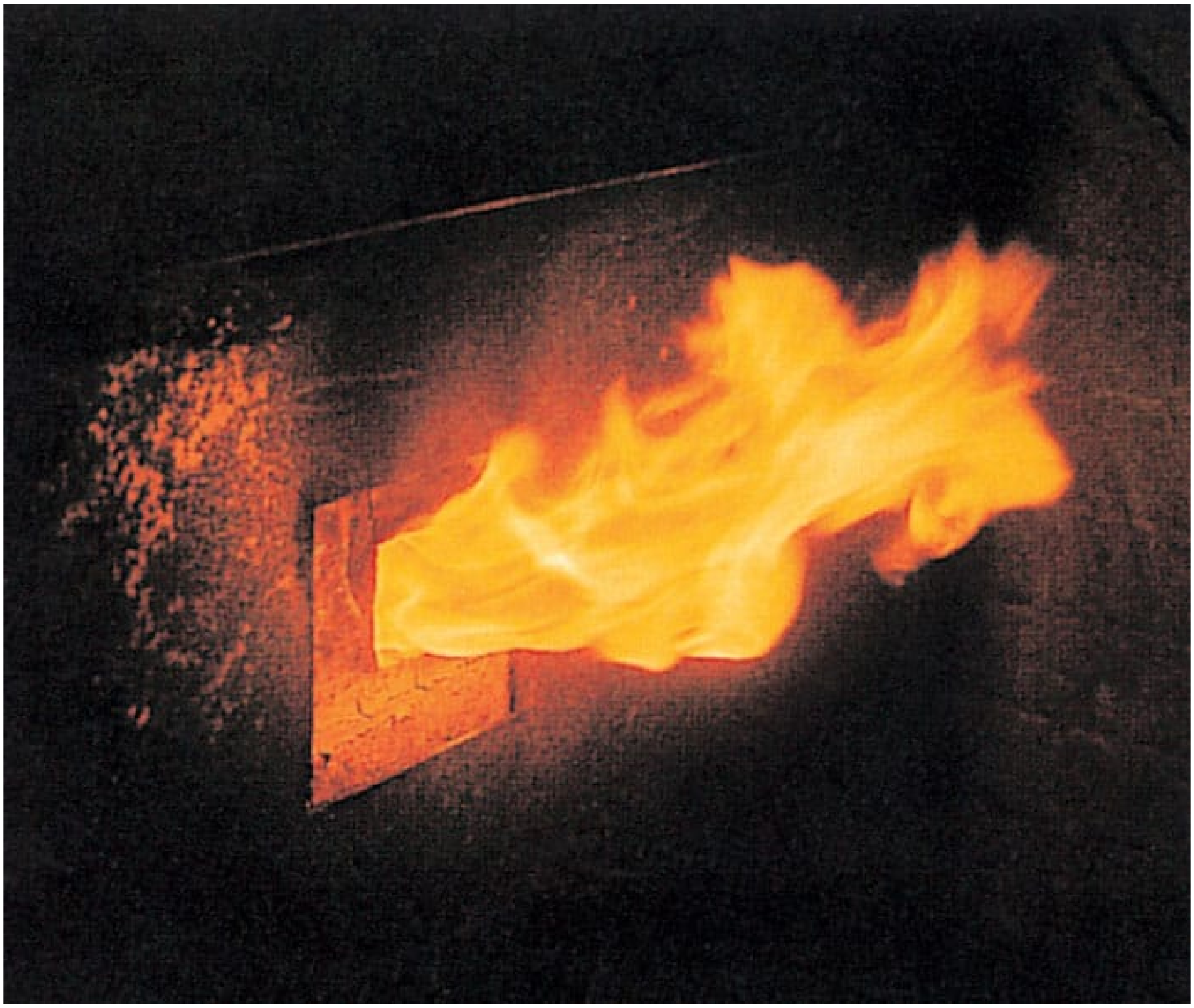


Packing a kiln for a glaze firing
This wood-fired kiln is packed for a glaze firing. Although pots should not normally be touching, the bowls seen here have no glaze on the rims and therefore can be stacked successfully. In some cases the rims may need to be separated with batting to prevent ash from sticking them together.

Bisque firing

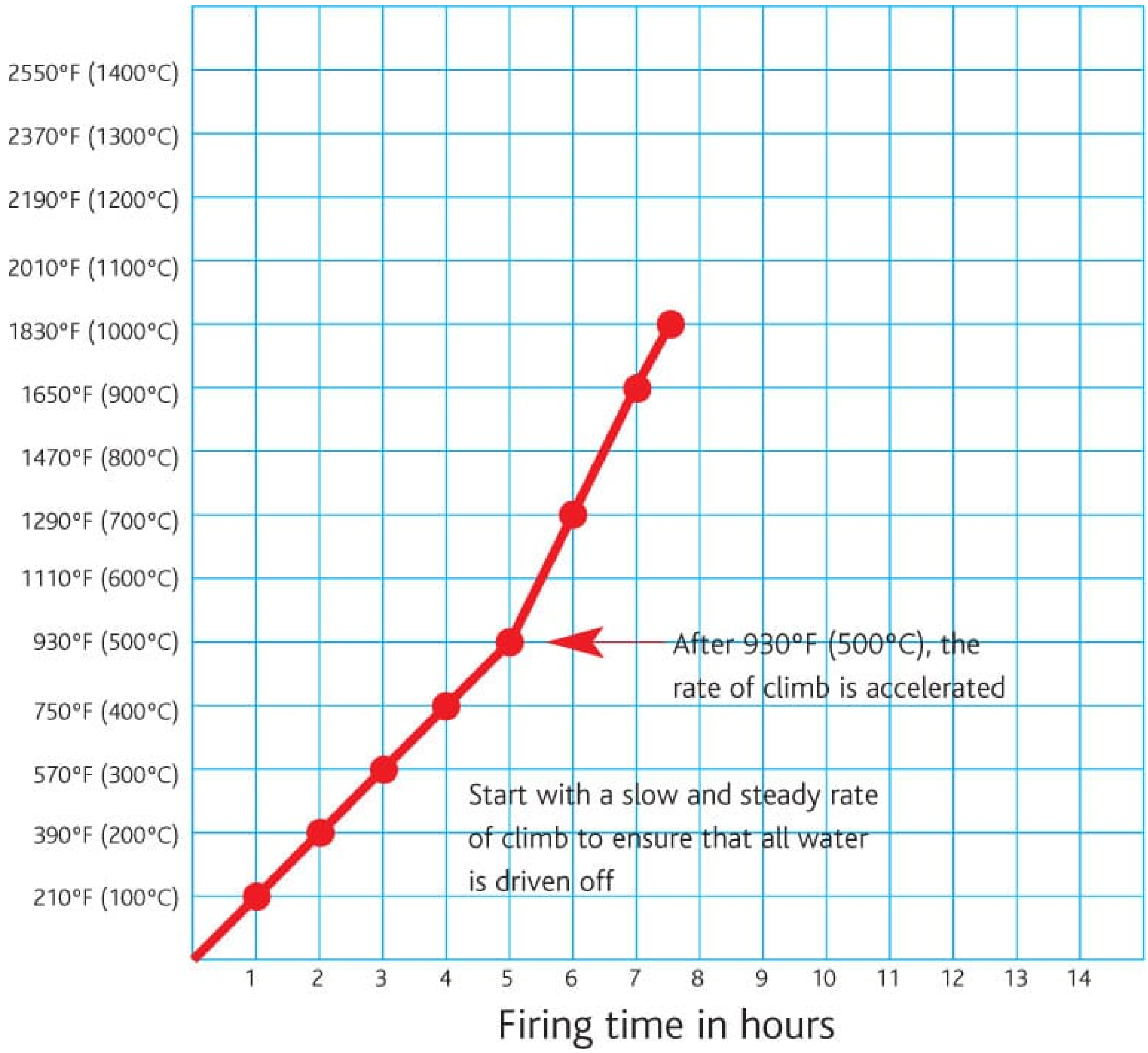
The first firing is known as the bisque (biscuit) firing, during which clay is changed through an irreversible chemical process into hard and permanent ceramic. As the name suggests, the clay has a biscuit-like appearance and is still porous. Pots must be completely dry before going into the kiln.

Bisque firing should be started slowly, ideally increasing at a maximum of 210–300°F (100–150°C) per hour. Leave bungs and spyholes fully open to let out the steam as the chemically held water in the clay molecules evaporates. This is usually driven off by 930°F (500°C) and the rate of temperature rise can then be increased to reach the final temperature quickly. Studio potters usually bisque their work to between 1760 and 1830°F (960–1000°C) to ensure that any carbon deposits in the body have been burned out.



The front bung on this gas kiln has been removed to show how a flame will leap out and grab oxygen from any possible source while the kiln is reducing.

Typical bisque-firing schedule



Glaze firing

After bisque firing, pottery is usually glazed and returned to the kiln for glaze firing. This firing differs from the bisque firing in several ways. The temperature achieved will be higher to melt the glazes, and no piece of work can be allowed to touch any other. If pieces do come into contact, they will stick and fuse together when the glaze melts. Glaze firing should be started off slowly to ensure that any residue of water absorbed from the glazes is evaporated. Once the kiln has reached approximately 840°F (240°C), the firing can be accelerated to the required temperature. The temperatures of different glaze firings denote the maturing point of the glazes and fall roughly into two categories: earthenware 1870–2050°F

(1020–1120°C), and stoneware and porcelain 2190–2400°F (1200–1320°C).

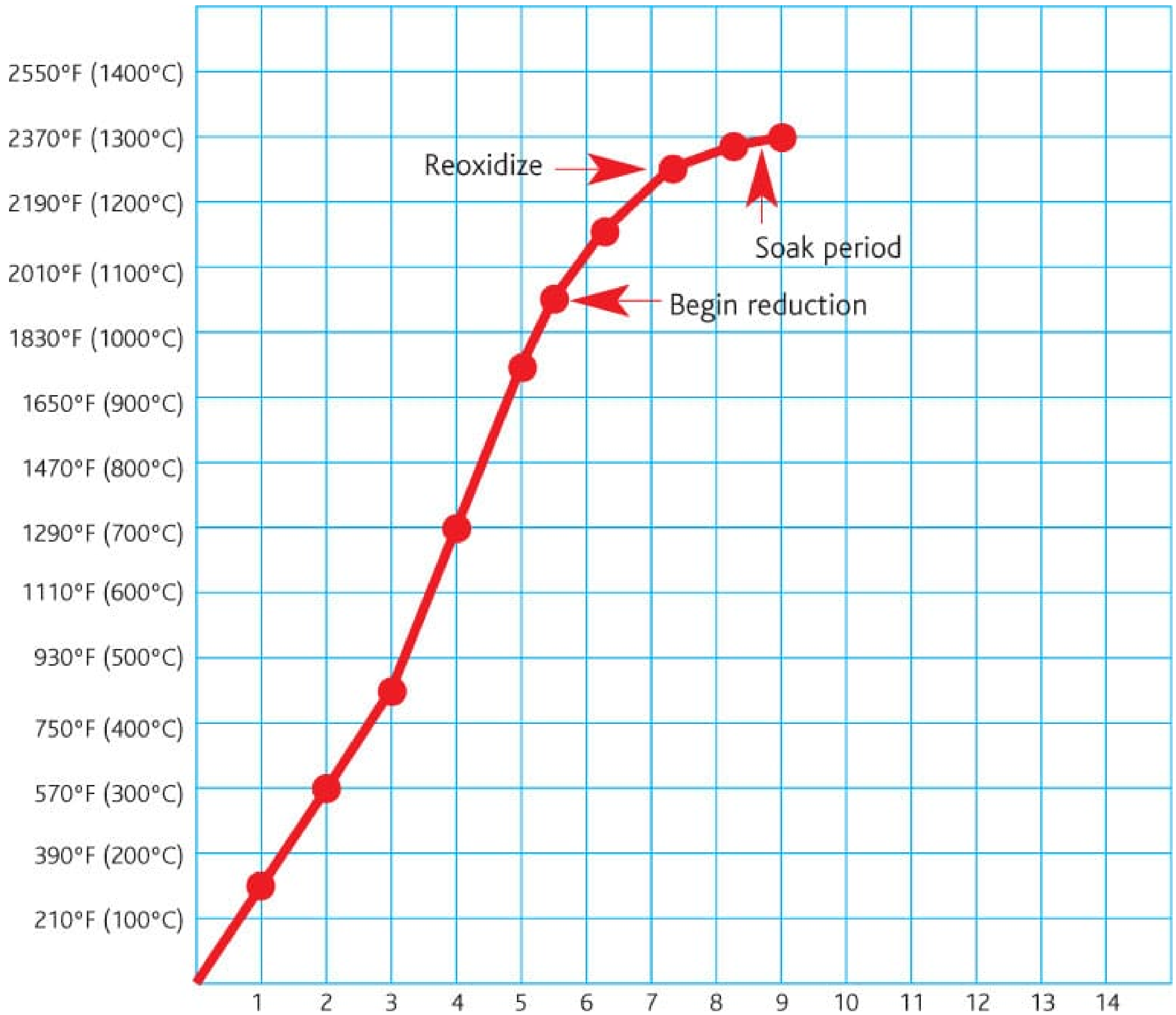
Reduction firing

During stoneware firings, the atmosphere inside the kiln is either oxidizing or reducing. Electric kiln firing is always mildly oxidizing, so a kiln that burns fuel—usually wood, oil, or gas—is therefore normally used for reduction firing.

The principle is to restrict the air intake so that some fuel remains unburned. The result of this partial combustion is carbon monoxide, an unstable gas that takes available oxygen from metals in the clay and glaze in order to achieve the stable form, carbon dioxide. The oxides most affected are iron and copper, and the low oxygen (reduced) forms of iron and copper oxides display different colors from those produced by an oxidized firing. In a live-flame kiln it is possible to reduce the air supply by closing dampers in the chimney, which has the effect of changing colors in the clay bodies and glazes. Reduction should normally start at about 1830–1870°F (1000–1020°C) before glazes have begun to stiffen and set. If reduction is started too soon, it may result in carbon becoming trapped beneath the glaze, possibly causing blistering. As the kiln reaches its maturing temperature, the damper should be opened up for a short period to re-oxidize the kiln and clean up the glazes and kiln chamber. Many potters maintain the final temperature for 30–45 minutes to even up any cool spots and ensure an even glaze melt.

Two porcelain celadonglazed pitchers showing color differences due to firing: oxidized (right) and reduced (left).

Typical reduction stoneware schedule


2550°F (1400°C)
2370°F (1300°C)
2190°F (1200°C)
2010°F (1100°C)
1830°F (1000°C)
1650°F (900°C)
1470°F (800°C)
1290°F (700°C)
1110°F (600°C)
930°F (500°C)
750°F (400°C)
570°F (300°C)
390°F (200°C)
210°F (100°C)
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Reoxidize
Soak period
Begin reduction

Two Tenmokuglazed mugs showing a difference in color from firing: oxidized (left), and reduced (right).

Further Information

Saggar and pit firing, pages 176–177
Raku firing, pages 178–179
Smoke firing, pages 180–181

Saggar and pit firing

A saggar is a fired clay box capable of withstanding high temperatures, and was originally developed to protect pottery from the flames of the kiln. These days many studio potters use saggars for the opposite reason—to protect the kiln from combustible materials packed around the pots in order to produce decorative effects. Many of these could attack the brickwork of the kiln or the electric elements. Pit firing also involves using combustible materials, but the pots are placed in a pit in the ground rather than in a saggar in a kiln. Both these firing methods cry out for experiment, for example kitchen waste can provide some interesting effects as they volatize and flash colors onto the work. Damp seaweed, banana skins, and string soaked in salt solutions can all have unexpected and wonderful results.

Saggar firing

1 Place the pots in a saggar and pack combustible materials around them. Here sawdust, salt, washing soda, string, and copper carbonate are packed around the pots. During firing these materials will burn, causing incidental effects on the surfaces of the pots.

2 Press the kiln shelf lid firmly onto its seal of clay. Any airway through to the saggar will lessen the effects of the combustible materials as well as allowing gases to escape, affecting the kiln interior.

3 When the kiln has cooled, remove the lid of the saggar to reveal the finished pots nestling among the remnants of the combustible material, now reduced to ash.

Pit firing

Pit firing is a more extreme version of saggar firing, where many pots can be packed into large holes dug in the ground and surrounded with materials and wood for firing. When blazing suitably, cover with a metal lid to retain the heat. If the fire dies down, lift the lid a little and throw more wood onto the embers. Remember that working this way has inherent dangers and suitable protective clothing, goggles, and gloves must be worn.

Packing the kiln
Ray Rogers packing one of his giant pit kilns ready for a firing. The pottery is laid on a 6-inch (15-cm) bed of sawdust to produce dark black areas, and then surrounded with charcoal and sprinkled with salt and copper carbonate to produce pink colors. The pit is gradually filled with wood and lit from the top to burn down over a number of hours. Restoring the pit during firing will increase the temperature.

Seaweed effect
This small thrown bottle by Paul Brimcombe was smoothed with a rubber rib while still on the wheel to compact and semi-burnish the surface. Wrapped in swathes of seaweed and then buried in a sawdust-filled saggar, beautiful ink blushes have flashed onto the bottle from volatizing salt and nitrates from the seaweed.

Saggar-fired bottle
The subtle blue hues in Meri Wells's bottle come from a thin cobalt oxide wash all over the pot. Small packets of salt and copper oxide were strategically placed alongside the piece to flash reduced copper red colors onto the surface. The clay was smooth but left unburnished to retain the dry, matte finish.

Further Information

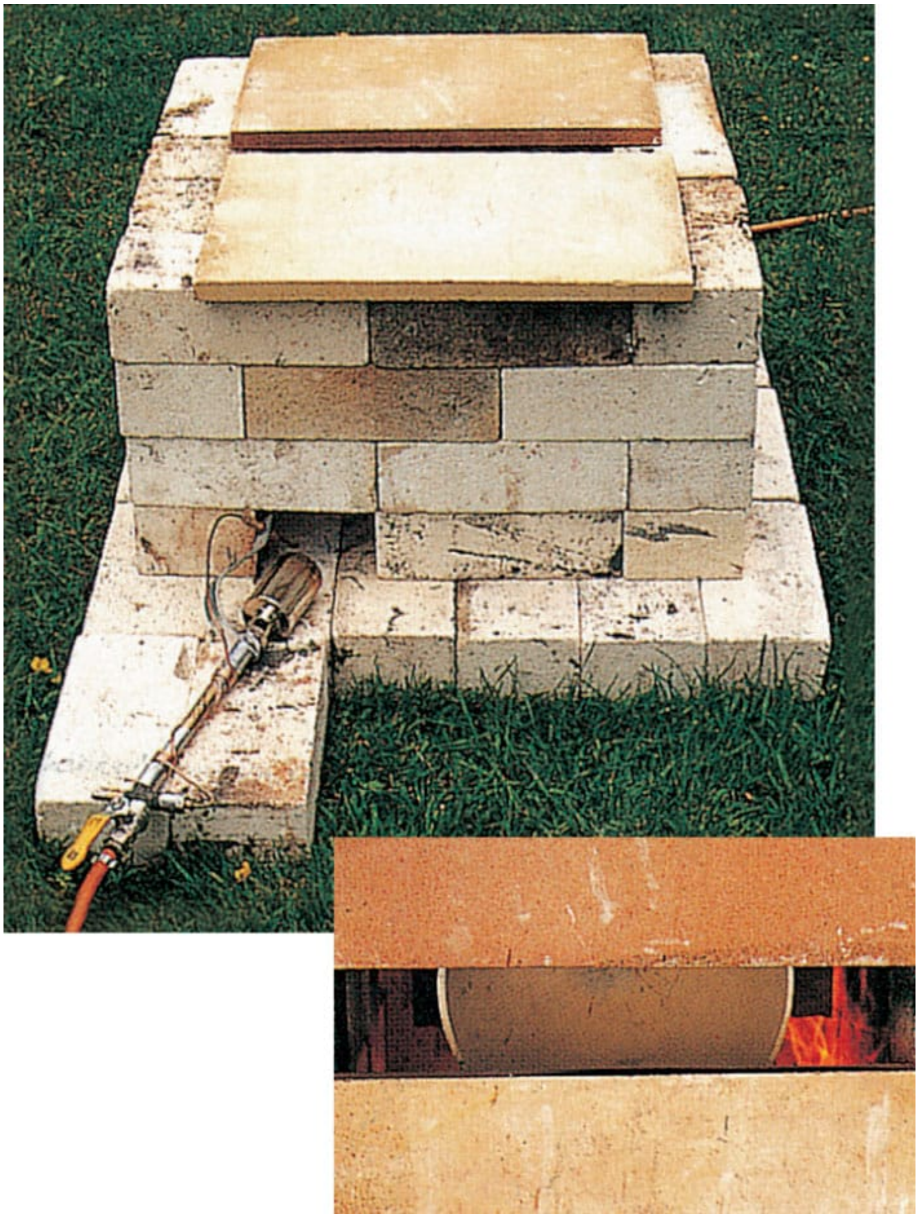
Reduction firing, page 175
Raku firing, pages 178–179
Smoke firing, pages 180–181

Raku firing

The term raku is derived from the Japanese expression meaning enjoyment or happiness, and is the name now given to a particular pottery technique. Of all the firing techniques, raku is probably the most exciting and spectacular. As a medium, however, raku is more decorative than utilitarian, as raku-fired pots are porous.

Raku pots are given a normal bisque firing to 1830°F (1000°C) before being glazed and placed into a raku kiln. After rapidly reaching a temperature of between 1650 and 1830°F (900–1000°C), usually in 20–30 minutes, the glazes have melted and the pots are removed with tongs, red hot and glowing from the kiln, and usually placed in drums of wood shavings. The pots undergo intense thermal shocks because of the violent and rapid changes of heat. This causes the glazes to craze and reduce, while smoke penetrates the clay body and enhances the crackles. Copper-bearing glazes will reduce, and flash rainbows of colors constantly move across the surface of the pot until cooled or quenched in water to seal the effects.

An electric kiln is not suitable for raku firing, and home building was once the only method. Coal or wood was often used, and kilns were always situated outdoors. Thanks to modern materials, such as ceramic fiber and high thermal insulation brick, it is now possible to buy a purpose-built kiln. Due to its lightness and portability such a kiln may be used under cover, provided there are extraction facilities. Bottled gas is the fuel most often used, because of its convenience.



Gas-fired brick kiln

High-temperature insulating bricks are best. Leave a two-brick gap on opposite sides of the kiln for the burner ports. Use kiln shelves for the roof, leaving a small opening of about 1 inch (2.5 cm) between the shelves to form an exit flue. Place a smaller kiln shelf inside the kiln supported on short props to lift the pots above the direct flame path.

Top-hat kiln

This "top-hat" kiln was made from an oil-drum cleaned of all traces of flammable material. The base is lined with heavy-duty firebrick so that it retains the heat, and the lid with ceramic fiber, which is light and easy to lift. Its design makes the pots easy to remove sideways, making it unnecessary to lean over the hot kiln.

Fiber-lined wire mesh kiln
A wire mesh cage can be formed and welded at the joints to make a kiln. Cut holes for the burner ports, exit flue, and a spyhole. The spy hole needs a flap wired over it so that it can be closed during firing. Line the cage with 1–2 inches (2.5–5 cm) of ceramic fiber insulation held in place with bisque-fired clay button wired to the frame with nichrome (heat-resistant) wire. When handling ceramic fiber the particles are hazardous, so make sure you wear gloves and a mask. A base made of insulating bricks with a layer of fiber on top is required.

Cross-draft wood-fired kiln

1 Flames are drawn from the firebox underneath the chamber and back through the pots, exhausting through the chimney.

2 The door at the side is opened a crack to see whether the glaze has melted on the pots inside. Flames leaping out to grab oxygen indicate a reduction atmosphere in the kiln.

Further Information

Bisque firing, page 174
Smoke firing, pages 180–181

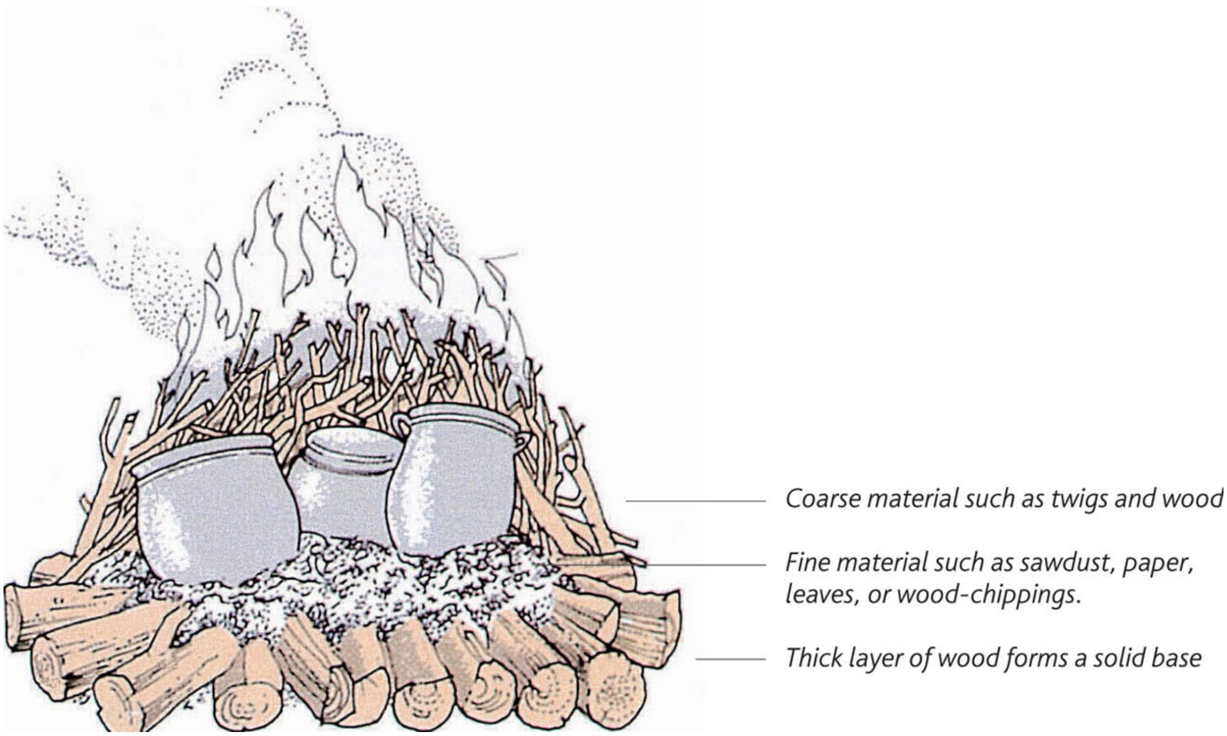
Smoke firing

In times past, a certain amount of smoke during firing was unavoidable, as combustible materials such as wood, plant materials, or dried dung were used. Some early firings were simply bonfires—the pots taking their chance in the flames, with little protection.

Once efficient kilns were developed, bonfires became a minority method of firing, but studio potters have adopted “smoke firing” specifically for the effects produced on the surface of their pots. A variety of fuels can be used, such as sawdust and shavings, hay and straw, dried plant material, shredded paper, and dried dung. Smoke firing has similarities to raku (see page 178) but raku is usually fired at a higher temperature (around 1832°F /1000°C) than smoke firing, which works from temperatures as low as 752°F (400°C).

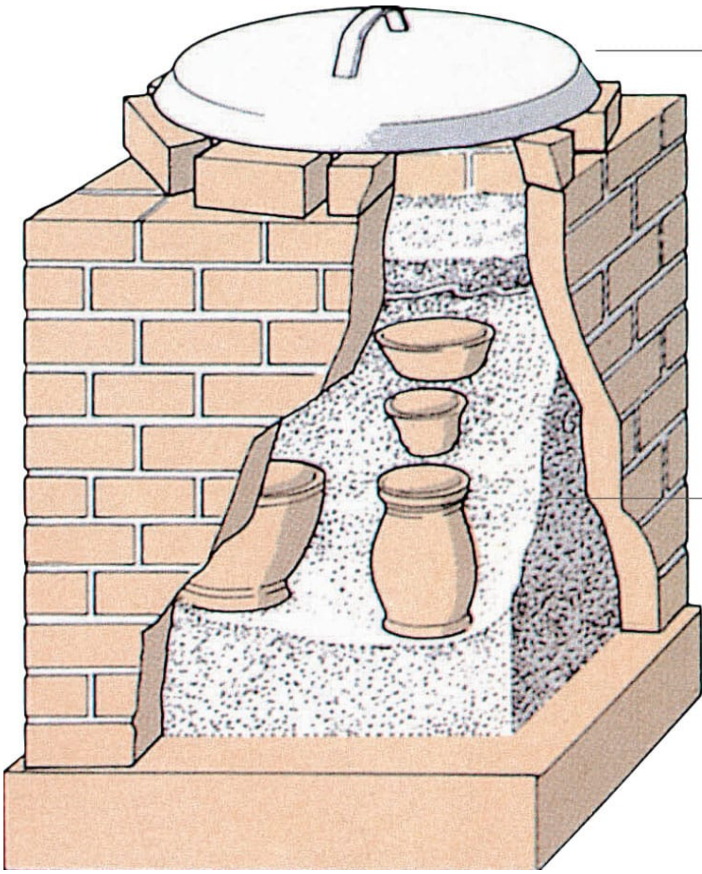
Smoke patterning
The pot was burnished, bisque fired, and then patterned with cut masking tape. The areas between the tape were infilled with clay slip, and the pot was then smoke fired. The firing burns away the tape but does not penetrate the slip, leaving a crisp, clear pattern.

Sawdust-fired forms
These slab-built forms by Tessa Wolfe Murray were treated with underglaze colors and glazed inside before smoking, using sawdust as a fuel.



Bonfire firing

Pots can be fired without the use of modern technology, but you will need to keep stoking the bonfire in order to reach a high enough temperature, and you are likely to lose some pots because of thermal shock.



Container firing
This is one method of smoke firing which, in common with others, is a finishing rather than a firing technique. The temperature reached is insufficient to fire the work, but the action of smoke has a dramatic effect on the surface. Smoking in a container is an easy and safe way to enclose the process and trap the smoke to maximum effect.

Further Information

Kilns, pages 168–169
Saggar and pit firing, pages 176–177
Raku firing, pages 178–179

Health and safety

It is important to observe a “common sense” safety code when making and firing ceramics, so please read and follow this advice on workshop practice.

Dust

Dust is probably the biggest hazard in the pottery studio. Some materials are toxic and must not be inhaled or ingested, but even clay dust is a problem. Particles of silica in clay are so tiny that they can bypass all filtering systems in the nose and throat, and settle in the lungs, causing irreversible damage. For this reason, be sure to heed the following:

Protective clothing
Preferred protective clothing is polyester, which does not hold the dust as much as natural fabrics. Wash your clothing regularly.

When spraying ceramic materials, wear a respiratory mask, and check efficiency of extraction equipment regularly. Wet-back spray booths, now in common use, are even more user-friendly.

Always wear heatproof gauntlets (foundry type) when dealing with the hot kiln, and proper protective shoes— not sandals. Tie hair back and beware of loose clothing.

Always wear a mask when doing "dusty" jobs, such as glaze mixing, fettling dry clay, or gritblasting.

Hazardous substances

Some materials are toxic and must be handled with caution. All materials should be labeled by your supplier, who will also be able to provide data sheets about them. Follow manufacturers' recommendations for use and storage.

Damaged packages should always be re-bagged, and dry materials preferably kept in a sealed plastic container—avoid the use of glass jars in the workshop. Keep bags and containers sealed when not in use, and always use a scoop.

Workshop practice

- Clean up immediately when spillages happen—don’t leave them to dry.
- Keep benches, walls, and floors clean by wet-wiping or mopping rather than brushing.
- Never eat, drink, or smoke in the workshop.

Electricity

- Do not get water on electric motors or switches, and make sure hands are dry.
- Machinery sometimes has a guard fitted. Never remove guards or operate machinery with the outer casing removed.
- Electric wiring is a job for an electrician. Never be tempted to do it yourself. All mains-powered equipment is potentially dangerous if wired up incorrectly.

Kilns

- Gas kilns: be sure to have a “flame failure” device fitted to the burners to avoid the risk of explosion.
- Make sure there are no combustible materials near the kiln when it is in use.
- Fumes emitted during firing can be harmful when inhaled. Enamels, lusters, covercoat, and some mediums give off especially noxious fumes. An adequate extraction facility must be installed, and if possible a kiln should be located in a separate room from the workshop.

Raku

- Do not use any kind of flammable solvents with a low flashpoint (such as methylated spirits) anywhere near the kiln or reduction chambers.
- A full-face visor is recommended for all raku-type activities.
- Beware of smoke inhalation and keep the smoke to a minimum.

- Remember that even though pots may not be glowing red, they can still be hot enough to cause serious burns.
- When pots are dunked into a bin of sawdust and the lid put in place, it can be dangerous to take the lid off and allow oxygen into the bin until everything has cooled down. A sudden intake of air can cause an explosion and unexpected flames. Some sawdust or shavings are from wood treated with preservative and can flare alarmingly.

Glossary

Altering Pots thrown on the wheel are round and symmetrical, but can be altered by exerting gentle pressure with the palms to create oval shapes. The rims of bottles and even bowls can be altered in this way.

Ash Useful ingredient as the fluxing agent of a glaze. Wood ash is usual, but coal ash, and any plant ash, is also usable. Ash also may have a high silica content, and combined with clay it will form a simple stoneware glaze.

Ball clay Clay of high plasticity, high firing and pale in color. An ingredient of throwing clay and other bodies as well as glazes.

Banding wheel A turntable operated by hand, used for decorating purposes.

Bat A plaster or wooden disk for throwing pots on, moving pots without handling, or for the drying of clay.

Bisque/Biscuit First low-temperature firing to which a pot is subjected. Moisture within the clay is driven off slowly in the form of steam, along with other organic compounds—clay becomes converted to 'pot', a chemical change that is irreversible. Bisque firing is usually between 1562° and 1832°F (850° and 1000°C) but can be higher if less porosity is required. Work is often bisque fired before being decorated in various ways.

Body The term used to describe a particular mixture of clay such as stoneware body and porcelain body.

Bone china A clay body with a quantity of bone ash in the recipe.

Carborundum stone A hard, dense stone used for grinding away rough patches on fired ceramic. Carborundum paper is used in the same way.

Casting Making pots by pouring slip into a porous mold to build up a layer of clay.

Casting slip A liquid clay used in the process of forming objects with molds. Also referred to simply as slip.

Chuck A hollow form made in clay or plaster that holds a pot securely during trimming.

Cobalt oxide/carbonate (CoO and $CoCO_3$) Powerful blue colorants. Used widely in ancient China, cobalt is said to have been first found in Persia. Blue and white decoration is one of the strongest traditions in ceramics.

Coiling Making pots using coils or ropes of clay.

Collaring The action of squeezing around a pot in order to draw the shape inward.

Cones/pyrometric cones Compressed glaze material formulated to bend at designated temperatures. The structures are placed in the kiln where they can be seen through the spyhole. They provide an accurate indicator of the "heat-work" of the firing i.e. the real effectiveness of temperature and time on the clay and glazes.

Copper oxide/carbonate ($CuCO_3$) Strong colorant in ceramics giving green to black and brown. Under certain reduction conditions it can give a blood red.

Decals Pictures or text printed onto special transfer paper and used to decorate pottery.

Deflocculant An alkaline substance, commonly sodium silicate or soda ash, which is added to a slip to make the mixture more fluid without the addition of water. The clay particles remain dispersed and in suspension, an essential quality required for casting. Also see Flocculant.

Earthenware Pottery fired to a relatively low temperature. The body remains porous and usually requires a glaze if it is to be used for containing water or food.

Elements The metal heating coils in an electric kiln.

Enamels Low–temperature colors containing fluxes, usually applied on top of a fired glaze. Enamels require a further firing to render them permanent. Also known as on-glaze colors or china paints.

Engobe Prepared slip that contains some fluxing ingredient. It lies half way between a clay slip and a glaze.

Fettling Term used when cast ware is trimmed and sponged to remove excess clay and seams. Fettling is done at the leather-hard or dry stage.

Firing The process by which ceramic ware is heated in a kiln to bring glaze or clay to maturity.

Flocculant An acid or salt which when added to slip has a thickening effect and aids suspension, delaying settlement. Calcium chloride and vinegar are commonly used as flocculants.

Flux An essential glaze ingredient that lowers the melting point of silica, the glass-making ingredient. A number of oxides serve as fluxes, each having its own characteristic.

Foot The base of a piece of pottery on which it rests.

Foot ring The circle of clay at the base of a pot that raises the form from the surface it is standing on.

Frit Material used in low temperature glazes. Frits are made by heating and fusing certain materials together, after which they are finely ground to a powder. In this way, soluble or toxic substances can be stabilised and made safe to use.

Fused Melted together, but not necessarily vitrified.

Glaze Super-cooled liquid of glass-like nature that is fused to the surface of the pot.

Grog A ceramic material, usually clay that has been heated to a high temperature before use. Usually added to clay to lessen warping and increase its resistance to thermal shock.

Iron oxide The most common and versatile coloring oxide, used in many slips and glazes and often present in clays, too. Red iron oxide (rust) is the most usual form but there are others (black iron, purple iron, yellow ochre).

Kaolin ($Al_2O_3.2SiO_2.2H_2O$) China clay. Primary clay in its purest form.

Leather-hard Stage during the drying process at which the clay becomes stiff and no longer pliable, but is still damp. In this state it can be easily handled while retaining its shape.

Majolica Anglicization of maiolica, the decorative tin-glazed earthenware that had its roots in the medieval Islamic world but began to be widely made in Italy in the 15th and 16th centuries.

Once-fired ware*see* Raw glazing.

Oxidized firing The normal atmosphere within an electric kiln is oxidizing, meaning there is enough oxygen present to burn the fuel cleanly.

Plaster of Paris/plaster ($2CaSO_4.H_2O$) A semi-hydrated calcium sulphate, derived from gypsum by driving off part of the water content. Used in mold making.

Plastic clay Clay that can be manipulated but still retains its shape.

Porcelain Highly vitrified white clay body with a high kaolin content. Developed and widely used in ancient China, its low plasticity makes it a difficult clay to work with. It can be fired as high as 2552°F (1400°C), and when thinly formed the fired body is translucent.

Pyrometer Temperature indicator linked to a kiln via a thermocouple. Pyrometers can be analogue or digital, the latter being preferred by many potters these days.

Raw glazing The technique of combining the bisque firing and glaze firing in one single process. Pots treated in this way are known as once-fired ware. Glazing is usually carried out between the leather-hard and dry stages.

Reduction firing Method of firing in a kiln fired by combustible materials such as gas, oil or wood, where the supply of oxygen is limited to prevent full combustion taking place. This produces carbon monoxide, which takes oxygen from the metals present in both clay and glaze.

Refractory Resistant to heat, and in terms of clay, one that can be fired to high temperature without melting. Kiln bricks and shelves are made from refractory materials.

Resist A decorative medium, such as wax, latex, or paper, used to prevent slip or glaze from sticking to the surface of pottery.

Ribs Wooden or plastic ribs are tools used to lift the walls of thrown pots, while rubber ribs are used for compacting and smoothing clay surfaces. Some ribs are kidney-shaped and may be referred to as kidneys.

Saggar Vessel made of refractory clay used to contain pots during firing. In the ceramics industry, a “saggar maker’s bottom knocker” would beat out the clay for the bases of saggars with a kind of flattened wooden mallet.

Sawdust firing Sawdust is the fuel most often used for smoking or reducing ceramics at low temperatures.

Scrapers Thin metal and plastic tools used to refine clay surfaces. They may be either straight or kidney-shaped, and are sometimes referred to as ribs or kidneys respectively.

Sgraffito The cutting or scratching though an outer coating of slip, glaze, or engobe to expose the different colored body beneath. From the Italian word *graffito*, meaning to scratch.

Silica silicon dioxide (SiO_2) Primary glass-forming ingredient used in glazes and also present in clay. Silica does not melt until approximately 3272°F (1800°C) and must always be used in conjunction with a flux to reduce its melting point to a workable temperature range.

Single fired The making, glazing, and firing of pottery in a single operation. Also known as raw glazing.

Slab building Making pottery from slabs of clay.

Slip casting Casting slip is made from clay and water, but also contains a deflocculant, allowing a reduced water content. Poured into a plaster mold, casting slip is then left to build up a shell on the inside of the mold before pouring out the excess. Remaining moisture is absorbed by the plaster.

Soaking Time during the firing cycle when a steady temperature (often the peak) is maintained in the kiln to allow glazes to flow and mature.

Stains Unfired colors used for decorating pottery or a ceramic pigment used to add color to glazes and bodies.

Stilts Small shapes of bisque clay, sometimes with metal or wire spurs, used for supporting glazed pottery during firing.

Stoneware Vitrified clay, usually fired above 2190°F (1200°C). Any glaze matures at the same time as the body, forming an integral layer.

Terracotta An iron-bearing earthenware clay that matures at a low temperature and fires to an earth-red color.

Terra sigillata A very fine slip used as a surface coating for burnishing or other decorative treatments.

Throwing Clay is placed on a rotating potter’s wheel and formed by hand in conjunction with centrifugal force. Throwing is said to have been developed first in Egypt c. 3000 BC

Trimming/turning After throwing, pots are often inverted and put back on the wheel at the leather-hard stage. A metal cutting tool is used to pare off excess, cut details such as foot rings, and generally refine the form.

Underglaze A color that is usually applied to bisque-fired pottery and in most cases is covered with a glaze. A medium, such as gum arabic, is usually used to adhere the color to bisque but needs to be fired on before glazing.

Vitrification Process by which clay materials bond to become dense, impervious, and glassified during the latter part of a firing. The resulting pots are hard and durable. The vitrification point is the temperature to which a clay can be fired without deformation.

Water-based medium Carrier that allows a pigment to be applied in the desired way. Increasingly, water-based or “water-friendly” mixtures are being used in ceramics for reasons of convenience and safety, and in preference to traditional oil-based materials, which are often rather pungent and are flammable. Various mixtures are available, often based on glycerine.

Wedging/kneading Methods of preparing clay by hand to form a homogenous mix. It mixes clay of uneven texture and removes air pockets. Spiral kneading arranges the platelets in an advantageous way for throwing.

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Credits

Quarto would like to thank the contributing artists for kindly submitting work for inclusion in this book. They are acknowledged beside their work.

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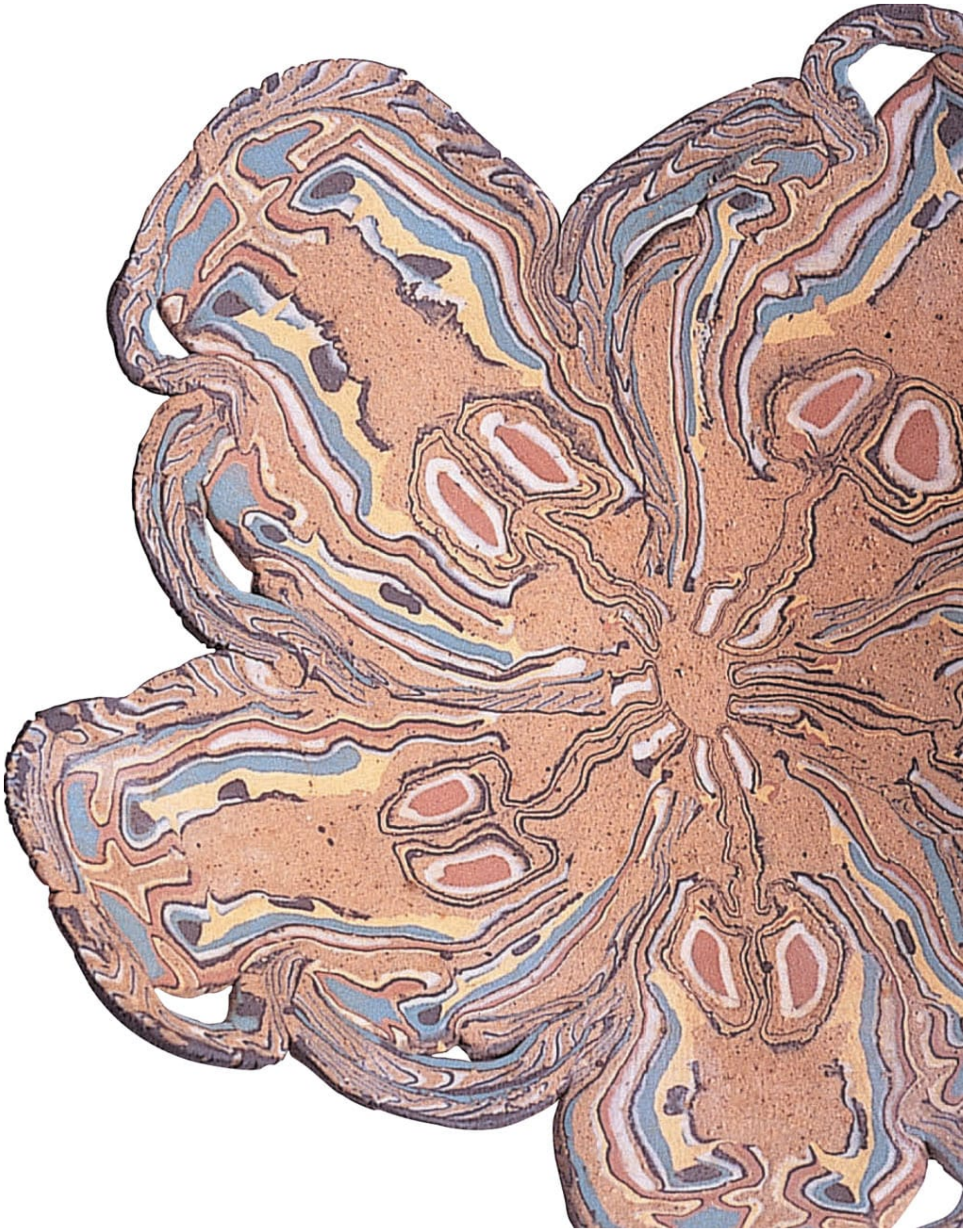

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