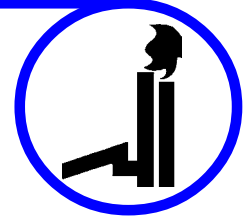


# Pottery and Porcelain Ware Industry Workers



## Occupational Brief Title Codes:

- D.O.T.: 570.-579.
- G.O.E.: 06.02
- S.O.C.: 51-9
- O\*NET™: 51-9
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## Occupational Subtitles:

- Artists
- Ceramic Engineers
- Clay Makers
- Decorators
- Drying Machine Operators
- Firers
- Glazers
- Inspectors
- Jigger Operators
- Kiln Placers
- Model Makers
- Pug Mill Operators
- Ram Press Operators
- Supervisors

## Work Classification Based Related

### D.O.T. Occupations:

- Annealers
- Concrete-Stone Fabricators
- Crusher Operators
- Glass-Ribbon-Machine Operators
- Lime Mixers

## Interests Based Related

### G.O.E. Occupations:

- Assembly Department Supervisors
- Cutting-Machine Operators
- Drill-Press Operators
- Laser-Beam-Trim Operators
- Wire Threaders

## Skills Based Related

### O\*NET Occupations:

- Conveyor Operators and Tenders
- Foundry Mold and Coremakers
- Industrial Production Managers
- Plastic Molding and Casting Machine Setters and Set-Up Operators
- Semiconductor Processors

**Pottery and porcelain ware industry workers** (ˈpɒtəri and ˈpɒr-ˌse-lain ˈweɪ ˈɪn-dus-tri ˈwɜːk-ərs) hand-build or operate machines to produce porcelain, ceramic, and earthenware products for market or sale.

The making of ceramic ware is one of the oldest arts in the world. People first began making nonmetallic minerals into artistic and useful items more than 200,000 years ago. Primitive people learned to shape clay into tools and water jugs by setting the objects in the sun to harden. But the Egyptians, Babylonians and Romans were among the first civilizations to make earthenware by hardening it with fire.

By the 1700's, England and other European countries were developing earthenware and porcelain ware in a factory setting. Today they blend non-metallic materials and heat them to make a variety of products such as brick, tile, cement, glass, dinnerware, sanitary ware, and enamels.

The term pottery is used to describe porcelain ware products, earthenware, stoneware, and china. Because ceramic materials are extremely durable they can be used to create an almost endless variety of products. Pottery items include ceramic tile for walls and floors, decorative knobs for cabinets, statuettes and figurines, insulators used in high-tension electric transmissions, and insulators used in appliances.

### Work Performed

The overall operations of a pottery and porcelain ware manufacturing plant are broad and diverse. A finished product is the result of the plans and efforts of hundreds of people. To manufacture pottery and porcelain ware takes the combined effort of engineers, artists, managers, marketing and sales workers, among others. Occupations within the industry run the entire spectrum from finance and operations to maintenance. The majority of jobs in a manufacturing plant, however, are held by production workers. In general, production workers are assigned specific tasks within the production process, and have job titles which describe those tasks. In some plants production workers perform a variety of tasks. In large plants, production workers often are responsible for only one part of the process.



*Pottery and porcelain ware workers hand-build or operate machines to produce products for market or sale.*  
Photo by CGP

The industry is highly automated involving assembly lines, computers, and machines. Most production workers work with machines that mix clay, and mold, heat, and decorate the pottery and porcelain ware. Many manufacturers have installed computer-controlled machinery. Operators of this equipment can program it to carry out a series of operations automatically. Using computer controls reduces setup and maintenance time, increases accuracy, and reduces waste. It also creates a need for workers with some knowledge of computer applications. Even so, hand tasks are still an important part of the production process. In some plants production workers may perform a combination of automated and hand tasks. Some manufacturers even continue to use the original methods of pottery making, creating hand-made pieces.

The making of a pottery or porcelain ware begins with the product design. *Artists, drafters, and ceramic engineers* develop models, forms, and decorations. They create new shapes and styles of products, improve old models, and design the tools and machinery to manufacture them. A few firms still employ *potters*. These craftworkers use a potter's wheel to work clay by hand to the right shape and size. These potters are usually the designers for production items.

Model departments make the first models called prototypes. There, *model makers* convert the ideas of artists and designers to working plaster forms called models. From the models, block molds are made, followed by case molds. *Mold makers* use these case molds to make the working molds for casting departments. After successful testing of a prototype, the factory carries out a pilot run. This is a first production run to test the design, production methods, and other specifications selected. If a pilot run proves satisfactory, then regular production of the model can begin.

The actual making of pottery and porcelain ware takes place in six basic steps: mixing raw materials, forming, drying, glazing, decorating and firing. There can, however, be multiple firings between drying and glazing as well as different decorating stages. The number and order of firings depend on the design of the piece.

In the first step *clay makers, slip makers, and wet mixers* make up batches of ceramic materials in huge tanks called blungers. Power driven agitators in the tanks mix the ingredients. The materials may include clays, silica, alumina, feldspar, metallic oxides, and other materials for special applications. The mix, called slip, is screened, passed over a magnet, and then pumped to storage tanks.

The next steps depend on the forming processes: casting, jiggering, or pressing. Slip made for casting is filter pressed by workers to take out part of the water. They then add materials to keep the slip fluid. They may then pump the slip to the casting department, where *casters* form ceramic objects by pouring the slip into plaster molds.

For jiggering and pressing, which need plastic clay, workers pass the slip through a filter press to remove most

of the water. *Pug mill operators* then run the pressed cakes through a pug mill. This process removes air trapped in the clay and squeezes out the clay in the form of a tube or column. Workers cut the clay to specific thicknesses for different forms.

*Jigger operators* shape plastic clay by running a machine with a template. A template is a metal pattern or tracing guide for shaping clay. The template may turn while the mold stands still. Or both mold and template may turn at the same time. Or the template may remain rigid and shear off excess clay as the mold turns. Formerly, jigger operators guided the template by hand to shape the molds. Now, machine roller jiggering is common.

*Ram press operators* and *hot press operators* tend machines that form clay between plaster dies. High pressure machines force the clay into shapes and then eject the pieces. The machines can form irregular shapes and curved pieces such as handles and spouts. Dry pressing of flat chinaware is now being done on high-volume production lines.

Workers finish the pieces of ware before they go to dryers. They remove seams and bumps, and repair pinholes and pits. They put on handles, spouts, and knobs. *Handlers* and *handle stickers* use slip to fasten handles and spouts on the ware. This is delicate work because the greenware (unfired ware) is fragile.

*Drying machine operators* and *dryer tenders* send the finished ware through dryers. They watch and adjust temperature and humidity controls. Tunnel dryers have controlled zones through which the ware passes on a moving belt. In the dryer almost all the water in the ware is driven off and evaporates at the surfaces.

Some dryers are automatic. Others require a great deal of handwork. Workers put pieces of heat-resistant clay between the items to keep them from sticking together. They also put items such as plates and saucers on setters (fireclay containers that hold single pieces). These steps ensure that the right warping or straightening takes place as the ware goes through the dryer.

After the ware dries, it is ready for glazing or decorating. Methods used to glaze and decorate ware vary. They include many hand procedures as well as machine steps. Decorations may go on the ware either before or after glazing. To apply glaze (a mixture of chemicals and glass suspended in water), *glazers* spray, dip, or brush the ware. Raw glaze consists of chemicals only; it contains no glass. Workers hand dip some items in vats of glaze. They hold the articles in the glaze and then shake them to remove excess glaze.

Some ware gets two firings. The first is called bisque (biscuit) firing. The second firing (after the ware gets a glaze and sometimes paint) is called glaze firing. Some ware gets only one firing in which both glaze and body are fired together. Luster, such as gold, copper or plati-

num, and other decorations require a third firing at a lower temperature.

**Kiln placers, kiln drawers, and firers** operate controls that keep the temperature constant in periodic or tunnel kilns. Ware in periodic kilns heats slowly and then cools. Ware in tunnel kilns passes through three temperature zones, which preheat, fire, and cool it. Some earthenware and stoneware are fired at lower temperatures. These porous goods are known as semivitreous china.

**Brushers** clean all the pieces after they have gone through the kiln. Mechanical brushes clean flat pieces, but many other pieces require hand cleaning. They may correct minor defects in fired ware using grinders and buffers to remove excess glaze.

**Decorators, decalers, lusterers, and banding machine operators** apply decorations to the ware. Some workers hand-paint designs on each article by using various size brushes dipped in colored glaze. Decal workers apply decals, or colored designs (like stickers), under or over the glaze. Lusterers and banding machine operators apply metallic or colored lines to the ware.

Throughout the entire manufacturing process, **inspectors** check items for quality and to make sure products meet specifications. They grade and reject items at different stages of production. They ensure that the pottery and porcelain wares are formed, glazed, decorated, or packed according to plant and regulatory standards.

**Supervisors** keep operations moving efficiently. They are usually selected from experienced, capable employees. They supervise and coordinate activities of production workers. They set up work and production schedules. They train workers in setting up and operating machines, and enforce safety rules and company policies. They observe processes and try to anticipate and forestall any delays or interruptions in the schedule. They confer with other bosses on how to keep production flowing smoothly, and meet production schedules.

### **Working Conditions**

Most of the workers in this industry have normal factory surroundings. Some parts of the factory are noisy from machines. Firing departments and clay shops may be hot and humid, especially during the summer months. Some workers lift heavy objects. Others stand constantly or move about. Still others sit while working. Machines do much of the heavy work in many plants.

### **Hours and Earnings**

Workers in the pottery and porcelain ware industry work about forty hours a week. They may work overtime during peak production periods.

Pay rates for production workers vary with jobs and experience within the industry, as well as employer and geographic location. According to the Bureau of Labor

Statistics, in 2004, production workers in the manufacture of pottery and related products averaged about \$13.78 an hour, and about \$515.00 a week. Piecework may increase earnings 25 to 50 percent. Apprentices' wages start at about 50 to 60 percent of a skilled worker's rate.

Benefits also vary. Most employers offer paid holidays and vacation time, sick leave, medical insurance, and retirement benefits.

### **Education and Training**

Most workers learn their skills on the job. Almost no high school courses offer instruction in the semiskilled and skilled jobs. Most high schools, however, offer courses in basic ceramics and clay handling. Many colleges also offer courses and degrees in ceramic engineering. Ceramic engineers study the nature of clay and other earthy materials. They create the formulas or recipes used by the clay makers, slip makers, and wet mixers.

Machine operators and mold makers should have a knowledge of high school mathematics and science. Decorators should have a background in design and art. Some knowledge of commercial art may prove useful.

Many machine operators and other skilled workers complete an apprenticeship, which is an agreement entered into jointly by a company and the union to offer qualified employees formal training. Apprenticeships take about four years of combined on-the-job training and class instruction. Some operations, such as banding and glazing, however, the workers learn by practice.

### **Unions**

The Glass, Molders, Pottery, Plastics and Allied Workers International Union represents workers in this industry. Some workers belong to the United Steelworkers of America, or other similar unions.

### **Personal Qualifications**

Pottery and porcelain ware industry workers should be careful, orderly people who pay attention to detail. They should be comfortable working around large pieces of equipment and machinery. They must be safety-conscious and observant of precautions when working with machines. These workers should have a tolerance for repetitive tasks. Hand decorators should have artistic talent.

Occupations can be adapted for workers with disabilities. Persons should contact their school or employment counselors, their state office of vocational rehabilitation, or their state department of labor to explore fully their individual needs and requirements as well as the requirements of the occupation.

### **Where Employed**

According to a report from the Bureau of Labor Statistics, roughly 30,400 people were employed in the

manufacture of pottery and related products in 2004—of which around 24,700 were employed as production workers. The first potteries in the United States were set up near deposits of clay suitable for dishware. Plants today are still in the regions where they started years ago. Major producers of pottery, porcelain ware, and related products are located in Ohio, New Jersey, West Virginia, New York, Pennsylvania, and California.

### Employment Outlook

The manufacture of pottery and porcelain ware is a steady industry. The outlook follows the trend of the industry as a whole. Although the market for pottery and porcelain ware remains stable, automation is reducing the number of workers needed. Skilled workers are more likely to have steady employment. Also, since the factories that make pottery and porcelain ware are restricted to certain areas of the United States, the work is not available everywhere.

### Entry Methods

Those who want to work in this industry may start as helpers. Persons who live near a pottery plant should apply at the employment office of the firm. Other sources of jobs are local state employment offices, the Yellow Pages of the phone book, and on-line job search databases.

### Advancement

Advancement depends on the kind and size of the firm. In large plants those workers with leadership skills and/or an education in ceramics may become supervisors. Small plants offer limited advancement. Some workers may become instructors who teach new employees.

### For Further Research

**American Ceramic Society**, 735 Ceramic Place, Suite 100, Westerville, OH 43081. Web site: [www.acers.org](http://www.acers.org)

### Acknowledgments

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### Noteworthy Quote

*“There is a satisfaction in the production of ceramic wares knowing that you are creating items essential to the quality of life. This quality is not only the utilization of a shape of the essential product, but its enhancement through decoration and design, rendering the product beholding to the eye, enhancing the serving of food, and contributing to gracious living. Other whiteware objects, including bathroom fixtures (tubs, toilets, and lavatories), and wall and floor tile, are essential to our ordered existence.”*

– **Robert J. Beals, Ph.D., Research & Development, The Hall China Company, East Liverpool, Ohio**

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