

# MINERAL PRODUCTS



Minerals are used to make all kinds of products, including stained glass, glass lenses, talcum powder, concrete pipes, lime, paving blocks, bricks and cement.

In mineral products manufacture, you can make window glass for office buildings, or fire resistant glass for houses. You could also create ornate plaster pieces for hotel lobbies, make large pre-fabricated concrete sections for the construction industry, pavers for landscaping, concrete blocks for walls in fashionable natural colours and polished concrete flooring inlaid with coloured stones.

Working in ceramics, you can make floor and wall tiles, the latest tongue and groove bricks, bathroom and kitchen fixtures or a whole range of pottery.

The mineral products sector offers great opportunities for someone who loves variety and enjoys using a combination of skills. The knowledge you gain in one area also gives you the opportunity to move into other areas and industries later on.



*Marie Early*

"The good thing with Pilkington is there are a lot of opportunities. I've recently come back from the UK, where I not only visited some of our sites, but I also met some colleagues at a similar level to myself, through a training course.

Another good thing about my current role at Pilkington is that I can take all the experiences that I've had in the past, and all that we've developed as 'best practice', and introduce those to other sites..."

Senior EHS Advisor @ Pilkington Glass

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## MINERAL PRODUCTS

# CERAMICS



Ceramic products can be both functional and decorative. The ceramic products industry produces items such as bathroom sinks and accessories, roof capping tiles, pipes, kitchenware, decorative ceramics and floor and wall tiles for bathrooms, kitchens and commercial uses.

You can work in a ceramic products plant as a technician, operating machines to combine and process ingredients or finish products. You will supervise machine operations and adjust pressures, temperatures, tension, and other controls. You will use computers and a wide variety of equipment such as sandblasters, airwipes, brick core tips, extruders, presses, kilns as well as cutters, grinders and polishers.

If you have a more creative flair, you could work as a potter or ceramicist, moulding clay into mugs, bowls and tableware using techniques such as wheel throwing,



You may think of glass, pottery and bathroom products, but also consider:

- Space Shuttle tiles and jet engine turbine blades
- synthetic bones and dental implants
- liners used in a plasma arc furnace operating at 1600° C
- bearings that last up to 25 times longer than conventional steel;
- and varistors (variable resistors) ideal for electrical surge protection.

Ceramics can be very hi-tech...

**HI-TECH CERAMICS?**

moulding or hand building, followed by glazing and firing.

The ceramics industry offers great careers to anyone who enjoys making practical and/or functional products, working in a hands-on environment.

Relevant qualifications that could lead to a job in this area are to be found in the Manufactured Mineral Products Training Package ([see the Qualifications InfoSheet](#)).



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## MINERAL PRODUCTS

# GLASS



Almost everywhere you look, you will see glass in some form. A large range of glass products are manufactured in Australia, including laminated glass, safety glass, windscreens, mirrors, bottles, jars, glass fibre and glass wool products, mirrors, laboratory and scientific glassware, optical glass and even stained glass.

Glass is made by heating sand, glass waste and other materials to a temperature of over 1500 degrees in a purpose built furnace. This molten glass is then either cast to make products such as window glass or mechanically blown to create a variety of glass jars and bottles.

The Australian glass industry is highly automated, and offers opportunities to learn to operate a range of equipment including computer controlled machinery and robotics.



Since the Stone Age, naturally occurring glass (such as Obsidian produced by volcanos) was used for blades, arrowheads and possibly mirrors.

Now we have glass that suits many purposes:

- safety glass resisting fire, bullets, blasts, and intrusion
- self cleaning glass
- noise reducing glass
- thermal insulating glass;
- and 'switchable' glass that can change from transparent to 'solid' at the flick of a switch.

**OLD AND NEW**

New glass products are constantly being created. If you love variety, enjoy using a range of skills and like solving problems, then Glass Production could be a great career for you.

Relevant qualifications that could lead to a job in this area are to be found in the Manufactured Mineral Products Training Package ([see the Qualifications InfoSheet](#)).

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## MINERAL PRODUCTS

# CEMENT & LIME



The largest part of the Cement and Lime sector involves the manufacture of cement, usually in plants located near major limestone deposits outside of major cities. Cement is a widely used material in the building and construction industries and is the most important component of concrete.

Many varieties and blends of bagged and bulk cements are designed for special purposes, such as high performance cements at airports, or cements used in harsher environments like breakwaters.

High calcium lime products, such as Quicklime and Hydrated Lime, are supplied from limestone quarries to a wide variety of users in the steel and agricultural industries and to cement manufacturers.



There are 3 major cement manufacturers in Australia producing many products including high-quality 'environmentally sensible' blended cement products. These use cement, fly-ash (from coal electricity generation) and steel blast furnace slag.

Over the life of the product, this results in reductions in green house gases of 30%. In fact, in 2005 the industry was expected to exceed their greenhouse reduction target by 70%.

Solid.

**ENVIRONMENTAL CEMENT**

You can work in a plant that produces these products, controlling production processes, operating fans, conveyors, kilns or grinding equipment and monitoring temperature and pressure gauges.

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# MINERAL PRODUCTS CONCRETE PRODUCTS



Moulded concrete is used to make concrete pipes and fittings, concrete railway sleepers, concrete bricks, tiles and paving blocks, structural beams, building panels, manhole covers and even garden gnomes.

An array of interesting new coloured products and exposed aggregate concretes are being developed as well for use in driveways, paths and landscaping. Polished concrete finishes and other 'design' finishes are also used. Finishes can be tailored to the customer's personal taste and style and you can even create 'natural' looks by adding coloured oxides to the cement.

Concrete pipes are used for land development, road and freeway construction, irrigation, power stations and building projects. In a concrete products plant, you will learn to use equipment such as automatic stacking machines, splitters or



Concrete is used more than any other man-made material: 6 billion tonnes worldwide in 2005!

But one Australian company, over the past 20 years, has recycled and sold more than 10 million cubic metres of construction & demolition material, including 70,000 tonnes from the demolition of AFL Park at Waverley.

This recycled material has been used in the construction of Melbourne's Formula One Grand Prix Track as well as carparks and freeways ... and the technology is now being exported.

**RECYCLED  
CONCRETE**

cubers, rollers, concrete spreading devices, clinker mills, pumps and pipe moulds to harden concrete and remove water and slurry.

Relevant qualifications that could lead to a job in this area are to be found in the Manufactured Mineral Products Training Package ([see the Qualifications InfoSheet](#)).



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# MINERAL PRODUCTS PRECAST CONCRETE



Pre-cast concrete products are widely used, particularly in the building and construction industries. They are used by civil and drainage contractors, plumbers, builders and landscapers, for a variety of projects ranging from housing developments to new airports, and from multi story office blocks to pathways. They are manufactured and reinforced off-site and delivered to the site when finished.

Large-scale concrete fabrications are used for the walls of office buildings, flooring, structural members, paving slabs, lawn edges, walling sleepers, and drainage. Glassfibre and steel reinforced concrete products can range from simple rectangular beams and columns to complicated forms like the sails of the Sydney Opera House.

Varieties of precast concrete finishes have been developed using coloured aggregates and sand fines, and are considered the equal of the finest quality natural



#### Perth's Midland Brick Company...

- creates bricks, blocks, pavers, and retaining wall systems
- is in the Guinness Book of Records as the largest brickworks in the world
- focuses on working with youth, at risk and marginalised young people and their families, to provide support, training and employment opportunities;
- and won a 2005 Prime Minister's Award for Excellence in Community Business Partnerships with the Hills Community Support Group.

LAYING FOUNDATIONS

stone. Special design batches can also be made for particular applications such as high strength concrete sections for underwater tunnels.

Relevant qualifications that could lead to a job in this area are to be found in the Manufactured Mineral Products Training Package ([see the Qualifications InfoSheet](#)).



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## MINERAL PRODUCTS

# CLAY PRODUCTS



Clay products such as engineered bricks and blocks and terracotta roof tiles provide designers and architects with a comprehensive range of structural, fire protective and acoustic solutions not available with other materials.

Quality face bricks are used in residential and commercial construction, and masonry paving systems are developed specifically for commercial and public area landscaping.

The industry is creating innovative new clay products made in natural blends and earthy tones to complement different architectural and landscaping styles. New colours, textures and shapes are continuing to be developed. New tongue and groove bricks are now coming onto the market, making the laying of bricks easier and faster.



Clay has been used for centuries, in housing, cooking, to decorate our environment and document our lives:

- In 10,000 B.C. clay was used for roofing in China and the Middle East
  - People first began to fire clay about 6000 BC
- Before this clay bricks were dried in the sun and were often mixed with straw for strength.
- Roman clay cooking pots have been discovered dating to the 9th Century BC
  - The 'Terracotta Warriors' (8099 life-size figures of warriors and horses) date from 210 BC in the tomb of Emperor Qin Shi Huang

CLAY PLAY

In a clay products plant, you can shape and fire products in kilns, cut extruded clay or shape unfired clayware.

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