TRADE OF PLASTERING

PHASE 2

Module 3

Slabbing, Skimming, Dry Lining and Floors

UNIT: 9

Panel Moulding on Wall

Produced by

SOLAS

An tSeirbhís Oideachais Leanúnaigh agus Scileanna
Further Education and Training Authority

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Some images & text courtesy of Gypsum Industries Ltd.

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Introduction

Welcome to this section of your course which is designed to introduce you the learner, to identify casting plaster, interpret, draw and calculate areas of circles.

Unit Objective

By the end of this unit each apprentice will be able to:

- Outline the manufacture of casting plaster
- Interpret and draw circles
- Calculate areas of circles

1.0 The Manufacture of Casting Plaster

Key Learning Points

- Casting plaster-mixing, consistency, setting times, usage and manufacture

1.1 Casting Plaster

Fine Casting Plaster

Fine casting plaster is an off white plaster suitable for fibrous plaster work. i.e. decorative cornices, ceiling roses, general casting, modeling applications, also suitable for carving. The plaster to water ratio is 100/70.

Plaster of Paris

Plaster of Paris - Gypsum, from which plaster of Paris is made, is a sulphate of lime and is so named from two Greek words - ge the earth and epsun, to concoct, i.e., concocted in the earth. In Italy it is known by the name of gesso; in. Scotland it is called stucco; in America it is known as calcined plaster; and in the Irish trade as plaster. The term 'plaster' will be used from now on.

The writings of Theophrastus and other Greek authors prove that the use of plaster was known to them. A stone; called by Theophrastus 'gypsos', chiefly obtained from Syria, was used by the ancients for converting into plaster. Gypsum is mentioned by Pliny as having been used by the ancient artists, and Strabo states that the walls of Tyre were set in gypsum.

The Greeks distinguished two kinds-the pulverulent and the compact. The latter was obtained in lumps, which were burnt in furnaces and then reduced to plaster, which was used for buildings and making casts.

Gypsum is found in most countries; Italy, Switzerland, France, Sicily, Ireland, the United States and some of the South American States, also in Newfoundland and Canada. The latter is said to have the finest deposits in the world.

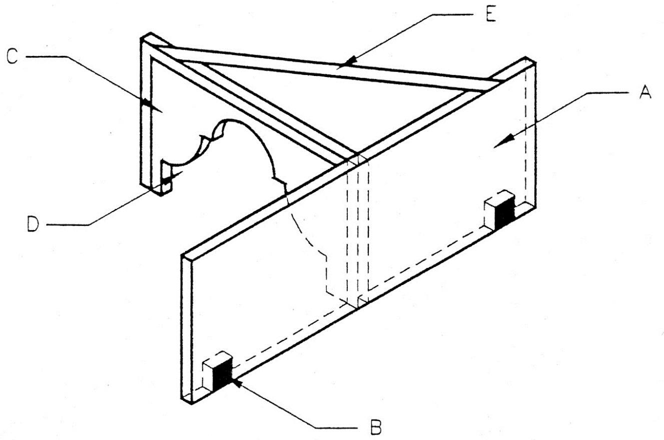
Plaster of Paris was known in Ireland by the same name as early as the beginning of the thirteenth century. The gypsum, in blocks, was brought from France, and burnt and ground here. It continued to be burnt and ground by the users until the middle of the present century. The burning was done in small ovens and the grinding in a mill, sometimes worked by horse-power or more often by hand.

Setting Qualities

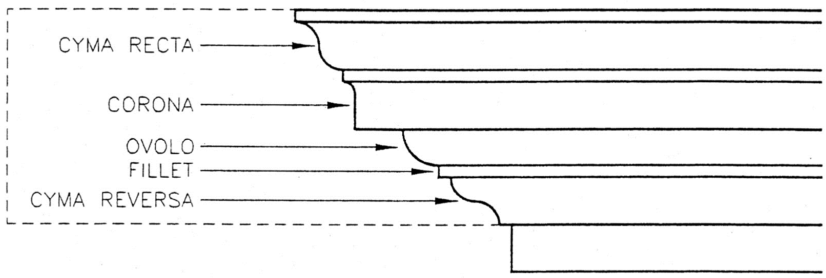
A basic property of plaster is its natural water demand. This is the amount of water required to combine with a fixed quantity of plaster to obtain a standard 'pourable' mix. Both the plaster and water are measured by weight and the required amounts expressed as a numerical ratio. Therefore, a plaster to water ratio of 100:70 is equivalent to a mix of 100 parts of plaster to 70 parts of water. Generally, if a greater amount of water is used per 100 parts of plaster, the mix will be more fluid, the strength reduced and the setting time lengthened.

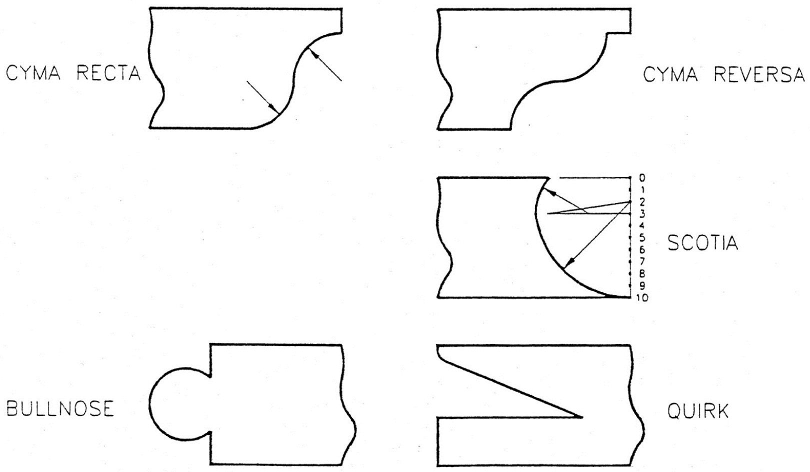
Conversely with less water, the setting time and thus working time of the mix are shorter but the hardness and compressive strength greater. It is important, therefore, to consider the ultimate use of plaster mix, selecting not only the type of plaster to use but also the optimum plaster water ratio. It must be decided whether workability or strength is more important. The precise consistency to use will depend on the individual application.

Terms Used in Mouldwork



a) horse b) slipper c) stock d) zinc profile e) brace





2.0 Circles

Key Learning Points

- Circle - properties, dividing into segments
- Calculation of circumference, area, radius and diameter using formulae

2.1 Circles

Facts About Circles

A circle is a curved line on which every point is an equal distance from a point called the centre.

The radius is a straight line drawn from the centre to the outer edge.

The diameter is a straight line drawn from any point on the outer edge through the centre to the outer edge on the opposite side. It is equal to twice any radius.

The circumference is the line of the outer edge, and is equal to the complete distance around the circle. It is analog to perimeter. Pi, or p, is the name given to the ratio expressed by dividing the circumference of any circle by its diameter. It is a constant approximately equal to 31/7 or 22/7 or 3.1416. If you measure the distance around any circle, and its diameter, and then divide the distance by the diameter, you will always get a result of approximately 31/7.

Before we look at the mathematics involved in finding the areas of circles, we need first to look at some of the names given to the various parts of the circle. On a sheet of paper draw a circle and write the names of the parts as I describe them. You may need the help of your teacher with some of them.

Centre

The centre point is the middle of the circle. The point of your compass was positioned at this centre point and the line forming your circle was drawn at a constant distance from it.

Circumference

The line that is drawn around the centre point is called the circumference. The circumference of a circle is a linear measurement. If we were to stretch a piece of string around the perimeter of a car tyre the string would represent the circumference of the tyre and could be measured.

Radius

The distance between any point on the circumference and the centre point is called the radius.

Diameter

The measurement from one side of the circle to the other side, passing on its way through the centre point, is called the diameter and should be thought of as the width of a circle. The line forms two semi-circles, one each side of the diameter. The diameter is always twice the length of the radius.

Degree

The amount that it was necessary to turn your compass in order to draw the circumference is one revolution. This is split up into 360 equal divisions, know as degrees. The sign for degree is 0. A degree can be split into smaller units called minutes and seconds. There are 60 minutes in a degree and 60 seconds in a minute.

Sector

A sector is an area of part of a circle, formed by two lines radiating from the centre point out to the circumference, and the portion of the circumference between two lines.

Arc

An arc is that part of the circumference that acts as a boundary to the sector. The arc is a linear distance.

Chord

A chord is a straight line joining two points on the circumference but not passing through the centre point. The smaller area of the circle cut off by the chord is called a minor segment, while the remainder of the circle is called a major segment.

2.2 Calculations Using Formulae

Finding the Circumference or Perimeter of A Circle

The sixteenth letter of the Greek alphabet is pi, often written as π. Mathematicians use it as shorthand to represent the ratio of the circumference of a circle to its diameter. This kind of shorthand is often used in mathematics. Where symbols or letters are used to represent equations, numbers or functions you do it often without thinking. Very few people write the words addition or subtraction when doing a calculation; we simply use the signs + or -.

Pi has a numerical value of approximately 3 1/7 or 3.142. . . the dots are another type of shorthand for saying the number has no end.

How accurate you require your answer to be when you use pi depends largely on what you are calculating. The space programme uses computers that calculate the use of the number Pi up to 2 million decimal places. We, however, shall limit ourselves to three decimal places or 3.142.

To find the circumference of a circle, measure the diameter of the circle and multiply by pi. You can prove this yourself, either in the workshop or at home. Measure the diameter of a piece of pipe, a cup or even a saucepan (the larger the diameter the better), multiply the measurement you have by 3.142 and check your answer by measuring the circumference with a flexible tape. If the two answers differ by a few millimetres it is the fault of the tape not the equation.

If the circumference of a circle can be found by multiplying the diameter by Π, it follows that the circumference of a circle can also be found using the radius. Remember that the radius is half the diameter, so we shall be required to multiply by 2, which gives the formula for finding the circumference of a circle as

2 x π x Radius or 2 π r

Pi is used to solve many mathematical problems founds in the building industry. We can work through the following example together, making sure you understand what has been done and then you can try the exercises.

Example

A plumber has been asked to make a lead slate to fit around a 150mm flue pipe. What length of sheet lead will be required to fit around the pipe?

If the pipe has a diameter of 150mm, then the radius will be 75mm. Using the formula

$2 \pi r = 2x3.142x75 = 471.3$

The sheet lead will need to be 471.3 mm long. **Note:** The plumber would also make an allowance for dressing and jointing.

Exercise

- Find the circumference of a circle that has a radius of 1 m.
- Find the circumference of a circle that has a radius of 300 mm.
- Find the circumference of a circle that has a radius of 8.9m.

Area of a Circle

The formula for finding the area of a circle is pi multiplied by the radius, the result being multiplied by the radius again, i.e.

Area of a circle = π x Radius x Radius or, better still,

Area of a circle = πr^2

Remember when you square something you multiply by itself. Therefore, radius x radius = radius r^2

Let's work out an example together, and then try the exercises. Find the area of a circle whose radius is 7 meters.

Formula to be used is πr^2

$3.142x7\ x7 = 3.142 \ x\ 49 = 153.958m^2$

Notice that the answer is given in metres squared. This is necessary as it describes an area.

Exercise

Find the areas of the circles in the previous exercise on page 6.

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