

TRADE OF PAINTING & DECORATING

PHASE 2

Module 3

Imitative and Decorative Arts

UNIT: 4

Industrial and Special Coatings

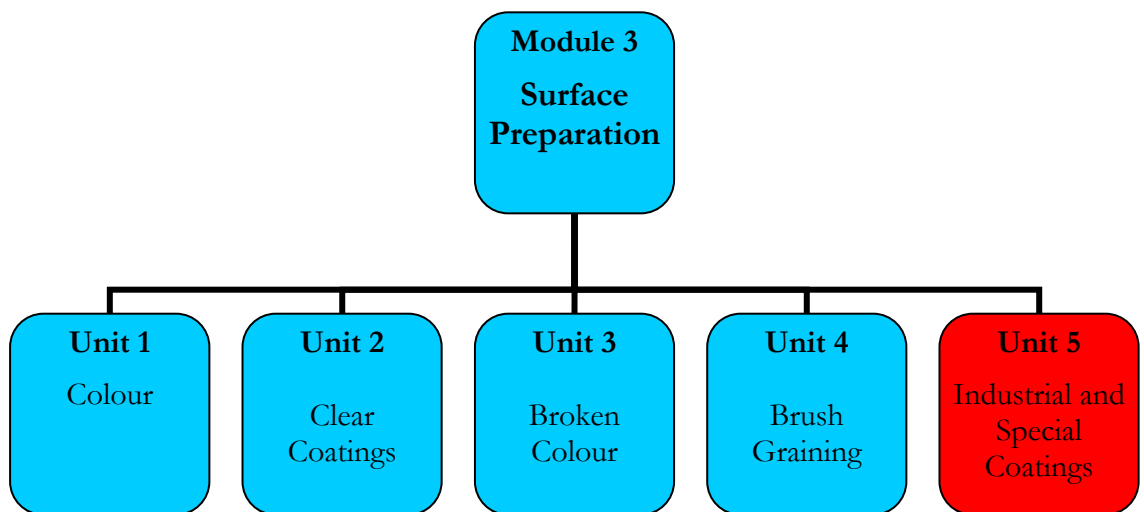
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Introduction

The terms floor painting, industrial painting and special coatings cover a very wide area of specialised work. For example, these paints are applied in areas such as garages and car show rooms. The floor paint on the garage floor must be able to resist oil spillages, heavy vehicles, and constant people traffic and must resist chemical detergents when cleaning. On the other hand the floor paint in the show room must be colourful, non slip and cleanable. This is a simple comparison of floor paints and their functions. It has become a specialised area as the equipment is costly and the painters have to be very well schooled in the wide range of materials and products being used. Places like chemical plants, food production factories, dairies, and aircraft hangers have to be treated with materials that will withstand chemical spillage, regular power washing with very hot water and detergents and heavy machinery constantly being driven on them. In schools, classroom floors, corridors toilets and canteens are treated with paints that are not alone functional but decorative. Hospitals, medical and veterinarian surgeries etc. have their floors painted instead of tiled as they are hard wearing, decorative but most important they are seamless which adds to their hygienic properties. A wide variety of solid colours are available, while speckle finishes and patterns of colour can also be introduced.

Industrial finishes are a big industry in the trade and the variety of paints used are constantly been developed.



Learning Outcomes

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

- Apply a floor coating as per manufacturer's specifications
- State the difference between ferrous and non ferrous metals
- Preparation and coating of ferrous and non ferrous metals

1.0 Applying Floor Coatings to manufacturers specifications

Key learning points

- Personal and public safety when using stated coatings
- Checking previous coatings for compatibility
- Identify the characteristics and uses of
 - Floor paint
 - Anti-condensation paint
- Preparing materials (Floor paints, anti - condensation paints)
- Preparing materials (floor paints, anti-condensation paints etc.)
- Methods of application
- Preparation of raw and previously coated areas

1.1 *Personal and public safety when using stated coatings*

In many cases because of their high solvent content these coatings are rated as hazardous materials and proper safety precautions with regard to the painter and the general public must be in observed.

Ventilation:

When applying these paints proper ventilation is essential as they can have very strong solvent odours. In some instances this work is carried out over week ends to accommodate the staff of the building where it is to be applied.

When spraying two pack paints an adequate air flow through the building must be provided to avoid a build up of fumes at any time.

If the natural air flow of the building cannot provide this then a mechanical one must be introduced. The area being worked in can be covered in with plastic sheeting attached to spring loaded poles that fit against the ceiling. To remove the fumes while the material is being applied a portable extraction system is fitted with on end inside the plastic canopy the other outside the building.

Recommended PPE must be worn at all times during the operation and should only be removed when outside the building.

1.2 *Cordoning off work areas*

- Before starting the work notify someone in authority so that the staff can be made aware and make the necessary changes to their routine.
- Appropriate signs must be prominently displayed
- red and white tape attached to posts to form an obvious barrier or walkway
- Keep working gear and materials inside taped area

- When work is complete notify someone in authority so that the premises can be used as normal again
- Remove all signs and tapes

1.3 Checking previous coatings for compatibility

It is very important to test for compatibility of the new coating and the one that is to be applied. The easiest way to carry out this test is to apply patches of the new coating to a number of areas on the old floor and check the reaction if any the following day.

1.4 Preparation of raw and previously coated areas

Raw concrete:

The concrete must be cleared of a material called laitance that comes to the surface of new concrete floors so that paints will have good adhesion. Good adhesion is all important when painting floors as it is an expensive job to have done and the customer expects it to last for a good number of years.

The preparation can be carried out in several ways

Acid etching:

A special acid is applied to the floor etching it by roughening the surface. In many cases this is not feasible as wiring is carried in trunking and may be damaged.

Vacuum blasting:

This is a very popular and effective method of roughening a floor before painting. It is also ideal for removing old paint completely or giving a key to a paint that is well adhered to and not need to be removed. As its name suggests it picks up the blasted material as it removes it.

Scabble:

This is a series of teeth on a roller in a machine that is moved over the floor to insert tiny perforations into the surface providing adhesion for the paint coating. A bonding test is carried out (floor paint applied and tested for adhesion) after the certain area of the floor has been treated. If the paint is not adhering the spikes are lowered to make deeper perforations providing the necessary adhesion.

Grinding:

A flat circular grinding disc attached to the bottom of a portable machine which is passed over the surface roughening the surface and providing adhesion for the paint.

1.5 Characteristics and uses of Floor paint

Floor paints must meet many requirements as they are applied to the most varied of areas from chemical and food plants to semi domestic areas

When selecting floor paint the painter must know what treatment this material will have to withstand. Single pack types are applied in semi domestic and are of low abrasion resistance. An aggregate can be added to increase its non slip properties.

Two - pack offer a wide range of resistance to a variety of harsh treatments and they do so very effectively. The following are some of their properties and characteristics.

- Good bond with substrate
- Chemical resistant
- Resist hot washing liquids
- Accept regular cleaning
- Hygienic surface
- Non slip
- Resistant to heavy vehicles
- Good colour selection
- Long Life
- Good colour choice

1.6 *Characteristics and uses of Anti-condensation paint*

Condensation:

Is the most common form of dampness encountered in buildings. It can be controlled if good ventilation is provided which will remove the moisture laden air from the affected area. The internal air can have a high level of humidity due to the activity conducted in the area e.g. washing and drying clothes, cooking, breathing etc. When this warm air comes into contact with cold surfaces such as single glazed windows and cold walls it can condense, causing dampness. Increasing the heat can aggravate the situation. Cold wall The water seen on the outside of a cold glass on a hot day is condensation.

Anti condensation paint:

Paint designed to reduce condensation. The paints available are water based and can be brushed or rolled. Two coats are recommended after suitable preparation of the surface. If any mould growth is present treat with a fungicidal wash before painting. Bare metal surfaces should be primed with a suitable metal primer.

The additives in this paint, act as an insulator by providing lower thermal conductivity. These materials form a barrier between the cold surface and the warm atmosphere of a room and in doing so reduce the level of condensation. They are suitable for interior walls and ceilings of rooms that have condensation problems. Due to the structure of the additives the paint has a textured finish. It does not lose any of its insulating properties when painted. It is a non reversible coating with low VOC rating.

A powdered material is also available that can be added to paint giving it insulating and anti condensation properties. The material comes in a pack which is added to 5 litres of paint. Ideal for buildings water tanks hot and cold water pipes etc.

1.7 Preparing materials (Floor paints, anti - condensation paints)

Preparation for the painting of floors is all important to ensure that the paint system to be used will dry and adhere. Single pack paints are straight forward in their preparation and generally applied by roller directly from the pot.

Two pack paints must be mixed according to the manufacturer's product data sheet and well stirred. They must be allowed time to settle before applying and have a pot life of one day. This means that the material will gel and will not be fit to apply.

Before applying the first full coat to a floor to determine how successful the preparation of the substrate has been a bond test must be carried out. If the paint has not adhered well then fragments of the substrate or laitance will be attached to the sample and this indicates that further preparation must be undertaken

Anti condensation paints are generally ready for use and require no thinning. Like all paints they should be well stirred and the guidelines in the manufacturer's product data sheet should be followed to get maximum performance from this paint.

1.8 Methods of application

- Airless spray
- Roller
- Serrated trowel

2.0 Ferrous and non Ferrous Metals

Key Learning points

- Ferrous and non ferrous metals
- Identifying millscale
- Use and storage of materials and tools
- Clean and safe working practice Primers for ferrous and non ferrous metals
- Following manufacturer’s specifications
- Personal safety when using mechanical tools
- Use of wire brush and mechanical tools

2.1 *Ferrous and non ferrous metals*

Metals are classified by their content, and a well known method of doing this is by using the terms “ferrous metals and non-ferrous metals”.

The term ferrous means a metal which contains iron. Non ferrous metal is a metal which contains no iron.

Ferrous metals include the various irons and steels.

Non-ferrous metals include brass, copper, aluminum, tin, zinc. Some precious metals such as silver, gold, and platinum are also non-ferrous.

2.2 *Identifying millscale*

Mill scale is a very thin black layer of oxidised iron that forms on iron and steel (ferrous metals) when is being manufactured. The molten metal during the process of making sheets, girders etc. comes into contact with air and oxides forming the millscale. It keeps the metal from corroding storage but it must be removed before painting.

2.3 *Use and storage of materials and tools*

The method of storing special Industrial paints, floor paints and their thinners is very important as they are expensive, flammable and in some cases have a short shelf life.

The materials should be stored in such a way as to have them easily accessed when needed and not having to shift too many other drums to get at them. Some of these materials come in drums of 5 gallons (19 litres) and are heavy. The area should be cool and dry and no open flame heaters should be used to heat the area. A recommended fire extinguisher should be in an easily seen place and no smoking signs should be prominently displayed.

2.4 Clean and safe working practice

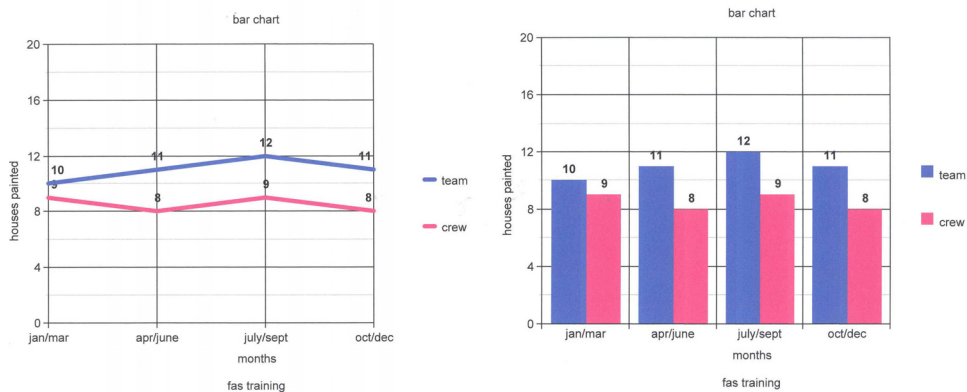
All areas must be free from grease, oil and other contaminants before painting commences. All access scaffolds must comply with the working at heights regulations. The working areas must be kept tidy as untidiness leads to unsafe practices and accidents.

Personal hygiene is a very important element in the apprentice’s development. The thinners used with these paints are too severe to clean hands with and special painters hand cleaners should be used. Barrier creams applied before beginning work and washing hands before eating are all important elements that must be adhered to avoid skin damage later on.

2.5 Statistical representation of data, pie and bar charts, trend graph

Graphs:

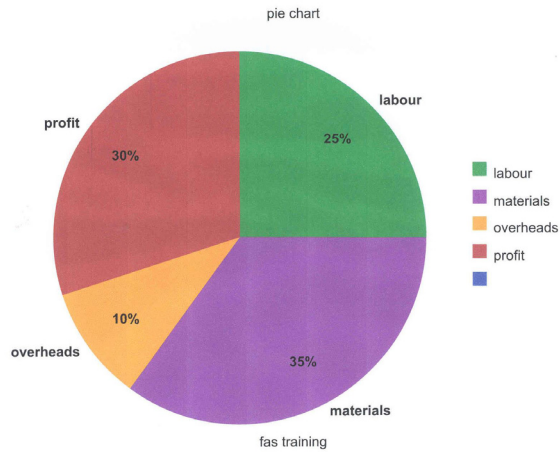
These two graphs represent two groups of painters, working on identical houses over a twelve month period.



The blue group operates a team system where the four painters share responsibility for the job under the guidance of a team leader. All members of the team are familiar with all aspects of the job, and therefore can change from one painting task to the other. This varies their work and so tends to make it more interesting. Also because they work as a team, their approach to the work is more motivated and systematic and yields better results.

The red group operates the old-fashioned system where all responsibility rests with the foreman. This system tends to keep painters doing that job that they are quickest at and so there is little variation in their work. Also they feel that their only responsibility is for the task they have been given. This de-motivates the painter and leads to lowering of production.

Pie chart



A pie chart can be used to show the elements of a job in their correct proportions relative to each other. e.g. The amount of time spent in preparation relative to that spent in painting. The above chart has been broken down into the four main components.

The above illustration shows the labour, materials, overheads and profit of a job.

2.6 *Primers for ferrous and non ferrous metals*

Ferrous Metals:

Ferrous metals like iron and steel will corrode if left exposed to the elements. To prevent this, the metal must be painted with a rust inhibiting primer followed by a paint system of adequate thickness.

Preparation:

Before painting can commence the metal must be thoroughly cleaned. All traces of rust or millscale must be removed completely to form a stable ground for the primer. Any traces of rust or millscale left on the surface will eventually loosen and fall off resulting in a breakdown of the paintwork.

The most successful way to remove millscale is to blast clean it. Priming is best carried out soon after the blasting ceases as the metal is warm, free from moisture offering excellent drying and adhesion.

Blasting:

This is a method where a stream of abrasive particles such as metal shot, and special sand are directed at high velocity at the surface from a designed gun using compressed air. It is the most effective way of cleaning metal as it is fast and it also roughens the surface providing a good surface for paint adhesion. Sometimes during the blasting peaks are created if the blasting material is too coarse, and these peaks protrude above the primer and will corrode if not covered. It is important that they are covered. High build primers are designed for this purpose.

Acid pickling and flame cleaning are not practical for the painter as they are much slower.

Weathering is another very slow method of removing millscale. This means leaving the metal exposed to the elements for many months until all the millscale is loosened and can be removed manually. This takes too long and is not practical.

Blasting is the most practical way of removing the millscale and providing a uniformly cleaned surface. Water blasting is another method used for cleaning.

BS 7079–A1 and BS 7097-A2 are the standards for blasting.

Priming:

After the surface has been prepared a good quality rust inhibiting primer must be used. This coating must be applied without misses and a second coat should be applied to edges, nuts and bolts etc. It can be difficult to apply paint successfully to areas like these as they have sharp edges.

On large scale industrial work the paint would be applied using airless spray which will apply the paint easily to these awkward areas.

Metals that arrive on site pre primed should be degreased with white spirit or suitable detergent before painting.

Non ferrous metals:

Non ferrous metals like aluminium, brass, copper, lead, zinc and bronze contain no iron so they do not corrode like iron and steel. Galvanised iron can also be accommodated in this category.

These materials do not need painting for preservation but it is done so for appearance or where they may be exposed to extreme marine conditions or chemical attack.

Surface preparation:

The first stage of preparation of non ferrous metals surfaces is cleaning. All dirt, grease and any other contaminating items must be removed. On site the heavy deposits can be removed with a suitable cleaning agent and then washed with a detergent solution and allowed to dry.

On small work the adhesion can be assisted by abrading with fine emery cloth and white spirit.

Priming :

Etch primers or wash primers :

These primers are applied thinly and are followed by a normal primer. There are two types, single and two -pack. The two- pack is a superior product but is being replaced by water based adhesion primers. These primers contain special adhesion promoters which have become very effective primers for non ferrous metals, tiles, shiny surfaces of all kinds etc

Any recommended paint system can follow.

Ferrous metals.

Preparation: The metal should be cleaned thoroughly by blasting for large work and hand cleaned for smaller work gates, railings etc. The clean metal work should be primed as soon as possible to prevent moisture affecting it causing light corrosion and needing light cleaning again.

Priming: The primer must be an anti corrosive type paint and must be of a type to suit the paint system e.g. If standard oil based paints are to be used then an regular oil based primer can be selected.

If on the other hand an epoxy coating is to be the finish the primer selected must be compatible with this paint system otherwise the strong epoxy solvents would soften and damage an oil based primer.

For smaller work paints are available that are all in one primer and finish. They must be applied to cleaned metal and after two hours coated again. If not then two to three days must elapse before recoating. It is important to follow the manufacturer's instructions to achieve best results.

There is a wide variety of primers and finishes available and manufacturer's websites and stockists brochures should be consulted

2.7 Following manufacturer's specifications

When using Industrial or special coatings it is vitally important to read the manufacturer's product data their health and safety data sheet so that the product can be used in the most effective way.

The fact sheet informs the painter on all aspects of the material and surfaces preparation including:

- Product description
- Benefits
- Colours
- Uses
- Conditions for storing
- Surface preparation
- Spreading rates
- Drying times
- Recoating times
- Bond test
- Application
- Technical information
- Package size

2.8 *Personal safety when using mechanical tools*

The use of mechanical tools is very important where blasting cannot be used. This may depend on the size of the job or its location etc.

Needle gun:

This power tool is designed to remove heavy rust from awkward areas such as railings, nuts and bolts etc. Not suitable for large work. It is a series of self adjusting needles in a casing. It is driven by compressed air. The needles can be changed and they range from pointed to flat depending on the work in hand. Not suitable for light gauge metals.

Mechanical wire brush:

They can be driven by compressed air or electric motor. Used to remove rust and old paint that has broken down from metal surfaces. A good tool for this work but unsuitable for large work. They range from large industrial to small domestic size.

Safety precautions when using mechanical tools.

Goggles, gloves and mask must be worn at all times

Lift before switching on and switch off before putting down to avoid spinning of the tool causing injury.

Never use in areas of high fumes as they spark. Procure special bronze fittings.

2.9 *Use of wire brush and mechanical tools*

This use of wire brushes, chipping hammers and powered tools such as mechanical wire brushes and needle guns is a commonly used but not very effective way of preparing metal. This form of preparation is particularly ineffective where the metal is in a very exposed area. It is used where blasting would not be suitable or the work too small etc. It is of no use if specialist coatings are to be applied as metal must be completely free of any traces of millscale or corrosion for these. It is very slow, laborious and difficult to get a uniformly clean surface but at times it is the only method available to the painter.

Wire brushes:

Different size wire brushes are available from a scrubbing brush type to long handled flat and round types. A flexible type is also available. Emery cloth can be used for small areas that are not suitable for brushing.

Summary

Industrial painting is a completely different type of work to interior decoration but many painting contractors apply themselves to both. Great care is particularly needed in the area of industrial painting because of the high solvent content of the materials and scrupulous care must be taken to ensure sufficient air flow and ventilation at all times.

The mechanical equipment involved must be respected because by its nature it poses a threat of injury through careless operating practice. The method of storage should take the general public into consideration by making sure they have no contact with it.

Floor paints are high performance types and when completed they offer a magnificent finish. From the beginning of the work the area has to be cleaned thoroughly and kept so until completion.

The importance of wearing PPE equipment cannot be emphasised enough when applying these products.

It is important that the painter be aware of the fact that a high degree of professional inspection and quality control is part and parcel of industrial painting, much more so than in decorative work. Professional paint inspectors are employed by clients and on large scale contract work by paint manufactures to check the quality of the work being carried out. Their task involves a thorough check of the quality of the preparation, e.g. the cleaning of the surface, measuring the profiles of the metals being painted, checking the dry and wet film thicknesses of the paint during and after application, pin holing of the paint film etc and also that the specification for the job, which for this type of work can be very precise and highly technical is rigorously adhered to.

Suggested exercises

Exercise 1.

Prepare a selected designated area and apply a floor paint to manufacturer's guidelines.

Exercise 2

Prepare a suitable area and apply an anti condensation paint.

Sample Questions

- Q.1 What is mill scale?
- Q.2 How is mill scale best removed?
- Q.3 What is a ferrous metal?
- Q.4 What is a non ferrous metal?
- Q.5 Explain condensation.
- Q.6 Where would a bond test be carried out?
- Q.7 List three tools used for hand cleaning metal

Recommended additional resources

British standard 6150 2006

Painting of buildings - Code of practice.

S O L A S

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