COATING APPLICATION GUIDE I-15

PURPOSE

This section provides a general description of the various application methods and an outline of the typical problems and causes encountered in applying coatings.

APPLICATION METHODS

The most important factor after surface preparation and paint quality that contributes significantly to the life of a coating system is proper application. Coatings today are more specialised in their use and in general, require specific application methods to be followed to maximise results.

Application methods include:

- Brush
- Dipping
- Roller
- Spray
  - airless
  - conventional air
  - electrostatic
  - high volume, low pressure

Brush Application

Paint should be applied liberally, spread uniformly, followed by a 'criss-crossing' action with the brush, and finally laid off in the one direction. Successful results depend largely on brushing techniques. Poor application will lead to an uneven coating and incorrect film thickness. A good quality brush should be used. After use all brushes should be thoroughly cleaned and dried.

This is the most expensive way of applying paint because of labour costs involved. However, there are some advantages:

- Low capital cost
- Suitable for on-site application
- Independent of power
- No loss through overspray
- Short set-up time

Possibly the most important technical advantage of brush application is in the priming of timber and steel – it ensures complete wetting of the surface and surface irregularities.

Dipping

Dipping offers one of the most economical means of coating application and the process may be either manual or automatic. High production capacities, low paint losses and the ability to coat internal and external surfaces at the same time are among the advantages that this method of application has to offer.

Disadvantages include start costs (e.g. building tank etc.) product type, limitations large volumes of paint required.

Coatings applied by dipping have a tendency to 'build up' at the bottom of the article. Therefore, it is important that specially formulated paints, having sufficient flow and 'clean run-off' properties are used for this process.

Success of a dipping operation depends on a number of factors including:

- Size and shape of the object
- Flow and run-off properties of the coating
- Rate of solvent evaporation
- Ambient temperature
- Adequate agitation of the paint to minimise settling of pigments
- Design of tank

Specific details of this method of application should be sought from the paint manufacturer.

Roller Application
Four types of rollers are in common use – synthetic fibre, lambswool, mohair and plastic foam. Lambswool and synthetic fibre are suitable for most types of paints - the plastic foam types are limited in their use as the foam is attacked by some solvent thinned paints. Synthetic fibre generally gives the most efficient transfer of coating to the surface. Mohair is usually only used for fine finishing.

The roller must be charged uniformly with paint, rolled over the surface with reasonable pressure and moved in all directions to distribute the paint evenly. If desired a more even finish may be obtained by laying off with a paint brush.

Rollers offer a faster means of applying coatings than brush application, but they do not work paint into the surface irregularities as well as brushes. It is advisable to apply prime coats by brush to ensure complete surface wetting. Matt finishes are particularly suitable for roller application but a little more skill is required for gloss finishes. Rollers should be thoroughly cleaned and dried after use.

Spray Application
This is an extremely fast method of paint application and therefore one of the most economic when considering only labour costs. Paint loss through overspray is often high with conventional air spray application methods but can be reduced by using High Volume, Low Pressure equipment.

Spray application is widely used in industry and offers many advantages:

- Speed of application
- Control of film thickness
- Allows the use of fast drying coatings
- Uniform finish
- Can be installed as an automatic process

Where overspray is a problem, this may be reduced or overcome by:

- Using High Volume, Low Pressure equipment
- Masking of the surrounding area
- Reverting to brush, roller or airless spray application

Spray painting requires a certain amount of skill and experience. The general proficiency of the operator and the nature of the coating itself will often determine if this method of application should be used. The basic principle of spray application is to atomise the paint into a fine spray and to direct the spray onto the object to be coated.

Airless Spray
Atomisation is accomplished by forcing the paint through a very small orifice at very high fluid pressure. This high fluid pressure is developed in a special air operated high-pressure pump and delivered to the gun through a single hose line. Atomisation occurs without the use of air jets because of the very high velocity of the paint developed at the orifice and the sudden release of pressure.

The advantages offered by airless spray include:

- Reduction of overspray and saves paint
- High build one pass painting
- Reduced volume of compressed air required compared to conventional spray
- Fast application
- Reduction in pollution
- The gun can be operated at heights from the paint supply without pressure drops at the spray tip

Airless Spray Guide

Following are several issues to be considered when using the airless spray application method:

- The thinner the material the smaller the orifice required – the heavier or thicker the material, the larger the orifice
- Fluid flow varies with orifice size and fluid pressure – the larger the orifice the greater the fluid flow and the faster the coverage
- Select the smallest orifice suitable for the paint and the job
- The greater the orifice angle the wider the fan pattern
- Select appropriate pump pressure by starting at high pressure and reducing gradually until the pattern and fluid flow are correct
- Maintain the gun parallel to the surface at a distance of 30 - 40 centimetres

Airless spray equipment must be thoroughly cleaned after use – thorough flushing with solvent and adherence to the manufacturer specifications is recommended.

Conventional Air Spray

Paint is contained in a closed container and transferred to the gun head by means of filtered compressed air. The spray gun is connected to a source of compressed air and utilises high-pressure air to atomise the paint and direct it onto the surface to be coated. This high-pressure air promotes overspray and blow back.

Some of the common problems that are encountered with airless or conventional air spray are listed below together with the possible causes:

Spray Problems	Possible Causes
Fingers or trailing	Pressure too low Material too thick Orifice too small
Hour Glass Pattern	Air pressure to pump too low Ice forming in exhaust muffler
No Spray	No fluid pressure Orifice plugged
Distorted Spray Pattern	Build up on spray cap Fluid pressure too low Worn cap

Electrostatic Spray

The principle of electrostatic spraying depends upon a difference in electrical potential between the paint and the object to be coated. To achieve this, paint being applied is fed to a specially designed electrostatic spray gun, disc or bell, where it acquires a high voltage charge. The object to be painted is connected to earth. As the paint is atomised from the gun, each droplet carries an electrical charge. Because of the difference in potential between these droplets and the surface to be coated, the paint is attracted towards the earthed object, where it impinges on the article to be painted, at the same time losing the electrical charge. The droplets are then able to coalesce and form a continuous coating.

The method of application offers a number of significant advantages including:

- Contoured objects such as chair frames, steel mesh, steel rod etc. can be painted without the operator moving around the object
- An even coating is applied over the entire surface of the article
- Overspray does not occur – this can represent a substantial cost saving in paint
- Automatic spraying is possible

The process is not without its disadvantages and significant among these is the possibility of fire through faulty discharge caused by poor earthing.

Electrostatic spray application is a highly specialised method, it is almost impossible to provide general guidelines. Different gun types require different paint conductivity and consequently paints suitable for electrostatic spray application must be specially formulated with particularly tight control over the conductivity. Therefore, specific advice is best obtained by direct consultation with the paint manufacturer.

High Volume, Low Pressure Spray
This method utilises a high volume of air at low pressure (10 psi or less) so overspray, blow back, paint loss and solvent emissions are significantly reduced.

ISSUES TO CONSIDER WITH SPRAY APPLICATION

Paint Viscosity
Thinning may be required to permit satisfactory atomisation – over thinning may produce sags and runs, low film build and may cause solvent entrapment.

Pot and Gun Pressure
Different types of coatings require different mixtures of air and paint. A simple adjustment method is:

- Adjust the pressure on the paint pot so that a steam of paint will fall one metre from the orifice of the gun when the trigger is pulled
- Adjust the air pressure to the gun until it is sufficiently high to provide a uniform wet film

Air Cap on Spray Gun
This controls the quantity and distribution of air mixed with the coating at the gun and is important in determining the spray pattern and degree of atomisation. For the best results adhere to the paint manufacturer recommendations on the type of Air Cap required.

Gun Nozzle (Paint Orifice)
The size of this opening will determine the amount of coating passing through the gun. For best results, adhere to the paint manufacturer specifications. Worn tips should not be used.

Gun Handling
For conventional spray, the gun is normally held 20 – 30 centimetres from the object to be coated. For High Volume, Low Pressure the distance should be about 15 – 20 centimetres. At all times, the motion of the gun should be maintained on a parallel path to the painted article.

Spray pattern is normally fan shaped with a higher rate of delivery of paint at the centre than at the extremities of the fan. Therefore, with each pass of the spray gun it is necessary to overlap approximately 20 – 30% of the preceding stroke.

COMMON SPRAY PROBLEMS AND CAUSES

Some of the more common spraying problems that are encountered are listed below together with the possible causes:

Spray Problems	Possible Causes
Sags in Coating	Too high film thickness Viscosity too low Gun too close to the object Incorrect nozzle size
Orange Peel	Incorrect thinner Insufficient thinner Atomisation pressure too low Wrong air cap
Overspray	Air pressure too high Gun held too far from article Material too thin Material supply too low Incorrect orifice
Uneven Spraying	Dirt in airports – wash with solvent and blow through
Splitting of Spray Pattern	Air pressure too high
Heavy deposit in centre of Pattern	Air pressure too low
Spluttering	Paint container empty or low Blocked or leaking line Blockage in tip or orifice
Dry Spray	Gun pressure too high Paint too thick Distance of gun too far from article

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