

WMRC Factsheet

Methods of Paint Application

There are about a dozen different ways to apply paint. Each one is uniquely suited to a particular job. This factsheet gives an overview of several types of industrial plant application methods and their strengths and weaknesses.

Airspray

The airspray gun uses air at 30 to 85 pounds per square inch (psi) to atomize the paint into a fine spray. This produces a smoother finish, and can be used on many surfaces. Air spraying is versatile; the operator can vary the air pressure, air volume, paint pressure, and spray pattern. It is much faster than painting by hand unless a lot of masking is required for the job. But air spraying does produce a lot of overspray (the paint that misses the intended target), and preparation and clean-up take more time.

A High Volume Low Pressure (HVLP) spray gun uses a higher volume of air at only 10 psi. This reduces the overspray and increases the transfer efficiency. It is portable and easy to clean, and has a lower risk of blowback to the worker. However, the atomization may not be good enough for fine finishes, and production rates when using HVLP may not be as high as with conventional spraying.

Airless Spray

This method uses paint under high pressure, 500 to 6,500 psi. Airless spraying has several distinct advantages over air spray—it is twice as fast, produces a higher film build, is more portable, cuts overspray by more than half, and is thus cleaner and more economical. But airless spray is limited to painting large areas, requires a different nozzle

to change spray patterns, the nozzle tends to clog, and the nozzle can be dangerous to use or to clean because of the high pressures involved.

Electrostatic Spraying

The differences between this and air spraying are that the electrostatic gun has an electrode at the nozzle and the object to be painted is grounded. The electrode runs 60,000 volts through the paint at 225 microamperes. The charged paint is attracted to the grounded object. This requires less pressure, produces little overspray, and uses relatively little paint. Electrostatic guns are good for painting oddley shaped objects. They also produce a uniform coat because the paint itself acts as an insulator; once the object is covered, it can take no more paint. The disadvantages are: only one coat is possible, only conductive materials can be painted; it's more expensive, slower, has higher maintenance costs, is limited to chargeable paints, and the surface of the object must be extremely clean. Because the gun uses electricity, this method presents a possible shock hazard.

Powder Coating

This is a variation of electrostatic spraying. The difference is that what is sprayed is a paint powder. The object is then baked, and the powder melts into a smooth, durable coat. Overspray can be reused, and no other pollutants are created or released because the powder has no solvents in it. The equipment for powder coating is expensive, so it may be economical for only larger businesses. A variation of this is plasma powder coating. The powder is fed into an extremely hot gas stream and is then sprayed at the object. Plasma powder coating

is for large objects that can't fit into a conventional curing oven. Overspray cannot be reused because it hardens.

Another variation is flame sprayed powder coating, where the powder is melted with a high temperature flame. Again, it is for large objects and overspray cannot be reused.

Rotary Atomizing

Another variation of electrostatic painting, rotary atomizers use centrifugal force, not air or hydraulic pressure, to drive the paint out of the nozzle. The atomization of this method is excellent, as is the transfer efficiency. This method can also be used with paints of different viscosity. Cleanliness is especially important to this method. Rotary atomizers can present a fire and safety hazard.

Dip Coating

With this process, parts are dipped into a vat of paint. This allows for a high production rate and transfer efficiency, and it requires relatively little labor. The effectiveness of dip coating depends greatly on the viscosity of the paint, which thickens with exposure to air unless carefully managed. Dip coating is not suitable for objects with hollows or cavities, and generally the finish is of lower quality.

Flow Coating

With this method, parts are carried on a conveyor. Anywhere from 10 to 80 streams of paint coat the parts. This system has the advantages of dip coating, along with low installation costs and low maintenance requirements. The quality of the finish is also about as good as with dip coatings.

Curtain Coating

Instead of many streams of paint, curtain coating uses a waterfall flow of paint to coat parts on a conveyor belt. Curtain coating has a high transfer efficiency and covers parts uniformly, but is suitable only for flat work. The quality of the finish is highly dependent on the viscosity of the paint.

Roll Coating

Paint is applied to auxiliary rollers, which then transfer the paint to the application rollers, which run across the part. This method has a high transfer efficiency and high production rates, but is limited to flat work.

Electrocoating (or Electrodeposition)

Parts to be painted are dipped into the paint. Then a current is applied, which electrically deposits the paint on the object. Parts are made primarily of steel. The transfer efficiency of electrocoating is over 90%. High production rates are possible, and production can be automated. However, this method is costly and requires a lot of energy. Also, employees need high level training to use this system.

Autodeposition

This is a dip process where organic paints are precipitated onto iron, steel, zinc and zinc-alloy plated objects. It is effective for its anti-corrosion properties and coverage of objects. Autodeposition also uses water-borne paints and uses no electricity. But autodeposition produces a dull or low gloss finish and has few available colors.

For Further Information

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