

WMRC Factsheet

Powder Coating

Wastes from painting processes, whether from industrial use, auto-body shops, painting contractors, or homeowners, can pose a threat to the environmental health of Illinois. Two options to reduce the amount of paint waste generated include using more efficient application equipment or techniques and using paints which create less waste. Changes in spray equipment and increased use of alternative types of paint, such as powder coatings, contribute to a higher transfer efficiency. This factsheet provides a general overview of powder coating technology and resources for further contact should more in-depth or technical information be desired.

Background

Nationally, original equipment manufacturers (OEM) use millions of gallons of paint for product coatings every year. For OEMs, the greatest potential to reduce paint-related waste generation exists in improving paint transfer efficiency. Low transfer efficiency results in solid, liquid and air emissions, as well as loss of usable paint. Through improving efficiency, costs associated with waste will be reduced as well as the costs of additional raw materials and paint. Not only an environmental benefit, but also a financial benefit results from increasing paint transfer efficiency. Powder coating has an estimated transfer efficiency between 90 and 97%.

Basic Principles of Powder Coating

Powder coating works on the principle that opposite charges attract. The powder, composed of resins and pigments, is pneumatically fed from a reservoir through a spray gun where the powder gains a low amperage, high voltage positive

charge. Clean parts to be painted are electrically grounded so that the positively charged powder particles are strongly attracted to the parts' surface. The powder coated part is then pulled through an oven where the powder melts and fuses into a smooth coating. Powder coating can be done manually by a worker or through an automatic system.

Powder coating technology continues to advance with powders being used for a variety of applications in the appliance, automotive, electrical, furniture, building/architectural, farm, garden and industrial machinery, and fabricated metal industries. Product manufacturers can specify the properties required in a finish, such as resistance to UV light, high durability, corrosion resistance, and color, to a powder coating manufacturer who then formulates the appropriate powder.

Types of Powder Coating

Two major types of powder coating are used for most applications: thermoplastic and thermosetting.

Thermoplastic—suitable for items requiring a thicker coating where extreme performance requirements are needed; will repeatedly melt when subjected to heat and solidify when cooled; principle resins used are vinyl, nylon, and fluoropolymers.

Thermosetting—decorative, protective, and thinner coatings; undergo an irreversible chemical change during cure; principle resins used are epoxy, polyester and acrylic.

For Further Information

The Powder Coating Institute
703/684-1770
FAX 703/684-1771

National Paint and Coating Association
202/462-6272
www.paint.org
email: npca@paint.org

Internet Resources

Powder Coating Information Network
www.powdercoat.com

Powder Coating Advantages

Quality—powder coating provides a sag, run, drip, and bubble-free finish which can be either smooth, or textured, very thin (1 mil) to very thick; high, medium, or low gloss finish.

Surface Flexibility—powder coating can be used on metals, glass, and plastic.

No Solvents—there are negligible volatile organic compounds released.

Overspray Can Be Reused—the dry powder overspray can be recycled back into the process, effectively reducing solid wastes.

No Liquid Paint Sludge—no liquids are generated that need to be disposed, thus saving money and reducing long-term liability.

Save Energy—venting of fumes not necessary, no need to control air make-up.

Increase Efficiency—parts can be racked closer together on a conveyor resulting in greater efficiency and lower unit costs. Reject rates may be significantly lower.

Production Reduced—air, water, and land discharges are significantly reduced, resulting in reduced costs for pollution control equipment. Less time and money needed for dealing with state and federal regulatory agencies.

Powder Coating Disadvantages

Available Chemistries—only about 7 resin systems with 13-20 cure mechanisms commercially available.

Conversion—conventional spray guns and booths cannot be converted to powder; large capital expenditure for conversion to powder (equipment, training).

Operation Conditions—parts must be clean and dry; parts must be cured at the proper temperature and duration for good adhesion; effective, consistently cleaned racks and hanging devices are critical for good contact to establish ground.

Application—limited means of application (electrostatic spray, fluidized bed); cure temperatures relatively high (generally over 300°F); limited application on non-metallic or non-conductive substrates; generally thicker films; color changes slow, more difficult than conventional coatings; efficient and economical only for application of larger series of parts.