

POWDER COATING

Powder coating is a protective coating and colour-finishing technique in which powder is used instead of paint. The powder is applied to the workpiece using an electrostatic spray gun which encourages the powder to adhere. The powder-coated component is then heated which causes the powder to form a smooth coat.

Various materials can be used for the powder: acrylic, polyester, epoxy or polyurethane, for example. Those who know their materials will recognise these as thermosets, but thermoplastics, with their different properties may be used. Nylon, polyethylene or PVC are frequently used for coating thin sheets of material which are expected, or required, to flex.

In comparison to spray-paint applications in general (which includes two-pack painting), powder coating is more efficient thanks to the electrostatic process, which reduces overspray by as much as 95%. The majority of colour granules in a powder-coat application arrive at the intended destination, and the amount that does not can even be reused in a later application.

POWDER COATING ADVANTAGES

Consistency: it achieves a more consistent finish than two-pack paint.

Durability: it creates a thick, adhesive finish that lasts longer than two-pack paint.

Speed: it can be completed in a single application, making it quick and efficient.

Diversity: it allows for a range of colours as you can mix and manipulate the powders.

Environmental: the process is friendly to the environment thanks to the relative lack of toxins or waste produced during a given application.

Consistency: it produces consistent, smooth and solid surfaces with no trace of application marks.

POWDER COATING DISADVANTAGES

Application inflexibility: it is limited to thick coats and in most applications thin coats of a powdered polymer result in orange-peel finishes.

Capital expense: a lot of expensive, high-tech equipment is required to apply powder coating: an industrial oven and an electrostatic booth in addition to the spray tools, all of which can be cost-prohibitive for the DIY crafts person or home-garage mechanic.

Limited applications: even though many consider it more durable for finishes on metal surfaces, it is not an option for rubbers and plastics which degrade when subjected to the heat process.

Difficulty in colour matching: it can be difficult to colour-match, particularly for metallic colours. Touch-ups, though rarely needed, are also problematic.

TWO-PACK PAINTING

Traditionally, paint coats have been achieved by applying paint in an aerosol using a high pressure spray gun and as the solvents in the paint evaporate the paint sets. The basics of a two-pack paint is that there are two components that you mix together prior to application, upon when a chemical reaction is started which causes the paint to eventually set.

TWO-PACK PAINT ADVANTAGES

Self setting: an expensive oven is not necessary, although some types may require this.

Colour range: it is available in an almost infinite range of colours.

Application flexibility: it may be applied thinly and still leave a smooth texture, which makes more suitable for items requiring thin coats.

Affordability: the paint and equipment, while more expensive than conventional spray paint, is simpler and more affordable than powder coating.

TWO-PACK PAINT DISADVANTAGES

Durability: while claimed to be more durable than conventional spray paints, it lacks the durability of powder-coated finishes.

Difficult to apply: it is more difficult to achieve an even coat and can leave trace marks and be under-applied in certain areas, over-applied and running in other areas and drip at points. It usually takes multiple coats to achieve a smooth, even finish.

POWDER COATING & TWO-PACK PAINTING: HOW DO THEY COMPARE?

In the powder coating v two-pack painting debate, questions abound. How durable is powder coating? Is powder coating better than painting? The answer could really be reduced to which of the two processes best meet the following criteria.

Cost Efficiency of Powder Coating & Two-Pack Paint

Economically, the main benefit of powder-coating is efficiency. With a general transfer efficiency of 60–70%, roughly two-thirds of the powder used for a given application serves the intended purpose. Paint, by contrast, has a transfer efficiency of only 30–35%, and thus wastes two-thirds of the paint used for a given application.

Even when you take the over-spray into account, all is not lost with powder applications. Once a powder coat has completed, the percentage of powder that falls aside can be collected and put back to use in the next cycle. No such form of conservation is possible with two-pack paint, which changes chemical composition and therefore becomes non-recyclable, regardless of whether it reaches its target or not, or indeed if it remains unsprayed.

Safety of Powder Coating & Two-Pack Painting

Powder coating is a safer process compared to two-pack painting because the polymer powder is inert and therefore free of toxins. Two-pack paint, by contrast, usually has toxic solvents and volatile organic compounds that can be harmful if inhaled.

While you do need to wear protective gear when applying powder coating, the process itself is generally cleaner and free of health-related risks. That said, it is crucial to keep the powder from making contact with your skin, but this is easy to achieve thanks to the low amount of overspray that results from the process.

Environmental Friendliness of Powder Coating & Two-Pack Painting

The eco-friendly advantages of powder coating extend well beyond the application process itself. Since there are no toxins or volatile organic compounds, unused portions do not emit greenhouse gases and since the majority of a given powder ultimately does get used, the option is also easy on landfills. To the contrary, each application of two-pack paint sends toxins into the atmosphere.

Mechanical Properties of Powder Coating & Two-Pack Painting

Mechanically, powder coating offers a greater degree of strength and flexibility than two-pack paint. Powder coat is stronger and more difficult to crack or peel. Powder coatings are more flexible which makes it a better option for items that change shape, as well as for moving parts.

The flexibility of powder coats makes powder the ideal option for vehicles which are subject to constant movement and vibration and the impact of stones, debris and other hazards that get kicked up by the tyres of moving vehicles.

Productivity of Powder Coating & Two-Pack Painting

Powder coating is a faster process due to the short time it takes for powder polymers to cure on a surface. Unlike two-pack paint, which may need days to fully cure, powder will fully cure in 20 minutes or less. A powder coated part could ultimately be put to work even before it has cooled down from its time in the oven.

Due to the durability and streak-free quality of powder coats, the process involved with powder applications is now seen as a necessary skill at production plants.

Colour Accessibility of Powder Coating & Two-Pack Painting

For colour-matching, two-pack paints exhibit their final, dry-state colours immediately. This makes it easier to mix and match paints with greater accuracy and achieve hues that are slightly off the basic colour scale.

Any supplier can mix primary and secondary colours to achieve the exact match of a required hue, alternately adding black or white into the mix and equal the tint, tone or highlight of a specified colour.

By contrast, blending of powder colours involves specialised production, in which the hue of a given colour relies on polymers that are broken down to form the powder. Consequently, the hue of a mixed colour can be difficult to determine in advance and, unlike liquid paints (which blend properties when mixed) different powders will not coalesce into a pure, uniform colour but show a speckled combination of colours which form when powders mix into one.

Reliability of Powder Coating & Two Pack Painting

When considering metal surfaces, the purpose of a paint or powder finish, in addition to protection from corrosion, is to offer aesthetic appeal.

If left exposed to water or moisture, ferrous metals can develop rust in spots and in the most rust-affected areas, pits may form in the metal surface. A solid coat of paint or powder prevents these corrosive effects from starting on the surfaces of metal, but only as long as the finish remains intact. Since powder finishes are stronger and more durable than paint coats, powder will generally guarantee superior, longer-lasting protection to the surfaces of metal-bodied products.

The colour of powder coatings also last longer due to the retentive properties of polymers, which resist chalking effects of moisture, heat and UV rays. Two-pack paints, by contrast, can slowly undergo a breakdown in resins and fade from prolonged exposure to sunlight, moisture and heat. The powders that offer the best resistance to chalking are those made from polyester.