A photograph of an industrial powder coating line. Large metal parts are suspended by yellow chains and straps from an overhead conveyor system. The background shows the complex machinery of the factory, including various rollers and structural elements. The lighting is somewhat dim, with a blueish tint. There are decorative patterns of red and blue dots in the bottom corners of the image.

# The Ultimate Guide to **POWDER COATING**





# THE ULTIMATE GUIDE TO POWDER COATING

## What Is Powder Coating?

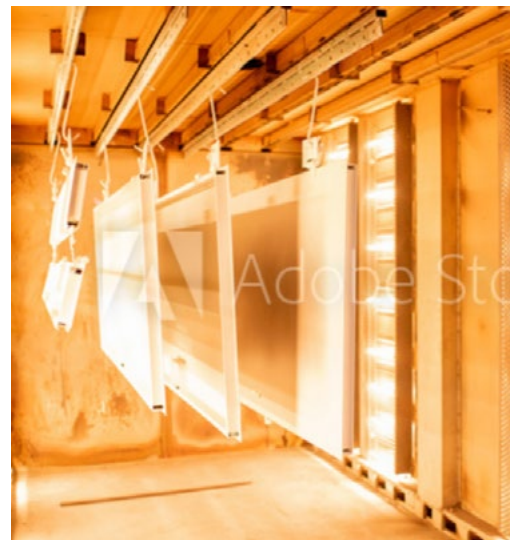
**Powder coating** is a finishing process in which fine, free-flowing dry powder material is used to form an even coating on the surface of an object.

It can utilize two main types of coating materials (i.e., thermoplastic or thermoset), which can be applied to a variety of surfaces (e.g., metal, plastic, and glass). This versatility, combined with the process's many other advantages (e.g., durable finish, low environmental impact, fast turnaround, etc.), make it suitable for everything from automotive parts to household appliances and furniture to industrial components and equipment.

# How Powder Coating Works

Powder coating is a three-stage process:

- 1. Pretreatment.** Before any powder coating material can be applied, the object's surface must be thoroughly cleaned to ensure maximum powder adhesion and optimal finish quality. While the exact surface preparation protocol depends on the material being coated, it generally involves cleaning, rinsing, and drying the surface. Equipment used for this stage includes wash booths, blast rooms, and dry-off ovens.
- 2. Application.** There are two main coating application methods: electrostatic deposition (ESD) and fluidized bed powder coating. In the ESD method, the powder is sprayed onto the surface of an object using an electrostatic gun, which electrically charges the material and causes it to adhere to the surface. In the fluidized bed method, the object is preheated and dipped into a fluidized bed containing the powder material. Equipment used for this stage includes a spray booth, powder material feeder, spray gun, and a power unit (for the ESD method), and an oven and fluidized bed (for the fluidized bed method).
- 3. Curing.** Parts coated using the ESD method must be cured in an oven after the application stage. Parts coated using the fluidized bed method can be heated before or after the application stage. They are heated before if they are dipped into the fluidized bed and after if they are passed through a powder cloud (electrostatic fluidized bed method). In all cases, when the appropriate temperature is reached, the powder's particles melt and merge to create an even, continuous coating across the object's surface.



# Types of Powder Coating Materials

While both thermosets and thermoplastics are used in powder coating operations, they come with different characteristics that make them suitable for different coating applications

## THERMOSETS

Thermoset powder coating material undergoes an irreversible cross-linking reaction during the curing process. This enhances the mechanical and chemical properties of the finish, making it relatively resistant to high temperatures and deformation. Common thermoset coating materials include:

- **Epoxy.** Epoxy powders form a hard, electrically insulating coating. However, their brittleness and sensitivity to UV light often limit them to indoor or underground applications.
- **Epoxy-polyester hybrid.** Epoxy-polyester coatings are softer and less susceptible to chalking, chipping, cracking, and weathering than pure epoxy coatings. This makes them slightly better suited for outdoor environments.
- **Silicone.** Silicone coatings can withstand high temperatures (over 1,000° F). As a result, they are often used in exhaust and oven systems.

## THERMOPLASTICS

Thermoplastic powder coating material does not undergo an irreversible chemical change when subject to curing temperatures. This quality enables them to be reformed and recycled. However, it also makes them unsuitable for high-heat environments. Common thermoplastic coating materials include:

- **Polyvinyl chloride (PVC).** PVC coatings are durable and pliable. They are often used in electrical wiring, fencing, and food processing applications.
- **Polyolefin.** Polyolefin coatings provide a smooth finish that is highly resistant to abrasives and chemicals, making them well-suited for lab equipment components, medical instruments, and other items that require frequent cleaning.
- **Polyester.** Polyester coatings are known for their weather resistance, which is why they are often used in outdoor furniture and exterior automobile parts.



# Advantages of Powder Coating

Powder coating offers numerous advantages over alternative coating methods, such as:

- **Greater durability.** Compared to liquid coating, powder coatings are more resistant to damage and degradation from abrasion, chemicals, impact, moisture, and other environmental forces.
- **Broader customizability.** Powder coating material is available in a variety of colors and finishes, which enables users to customize their coating to meet their needs.
- **Smaller environmental impact.** The powder coating process lacks many of the potentially harmful materials and byproducts present in traditional coating processes, which reduces the environmental risk it poses.
- **Faster turnaround time.** Powder-coated parts can be assembled, packaged, and shipped once they've been cured and cooled. This decreases the amount of time the parts will spend sitting in the facility.
- **Lower material costs.** Overspray material can be collected and reused in future powder coating operations, which minimizes the amount of material that is wasted and lowers material costs over time.



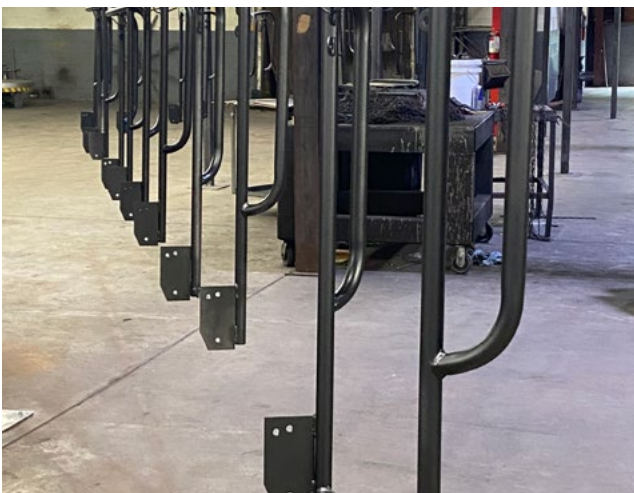
# Selecting the Right Powder Coating Service Provider

While there are many companies offering powder coating services today, it is important to choose your service provider carefully to ensure they can meet your specifications and standards. Four key questions to ask during the selection process are:

## DO THEY OFFER A FULL SUITE OF MANUFACTURING AND COATING SERVICES IN-HOUSE?

Companies that can perform not only powder coating services but other, related manufacturing processes in-house offer many advantages to customers with multifaceted needs. For example:

- **They can serve as a one-stop shop.** A good manufacturer choice will be one that can offer you a range of capabilities. If you need assistance with the full component development process, it is beneficial to partner with a company that offers design, fabrication, and finishing services. This allows you to reduce the number of companies you need to work with to complete the part production.
- **They can offer a quick turnaround.** With a one-stop shop, customers do not have to endure a collectively longer wait in order to have their parts manufactured and coated. As a result, your parts can be produced and coated that much quicker, and you can implement them sooner.
- **They can communicate better.** By working with a single company, you make it easier for yourself to stay updated on the current status of your project.



## CAN THE SERVICE PROVIDER GUARANTEE ON-TIME DELIVERY?

When a project is split among multiple vendors, there is a higher risk of production hold-ups, which can lead to costly downtime and delays. These hassles can be avoided by choosing a single, start-to-finish powder coating services provider who can guarantee on-time delivery.

## DO THEY OFFER CUSTOM CAPABILITIES FOR UNIQUE REQUIREMENTS—AND FAST?

From visually appealing cosmetic parts to durable machine parts, powder coating applications typically require specific colors, textures, and finishes to achieve the desired functional and/or aesthetic effect. It is important to choose a powder coating service provider with the appropriate resources and expertise so they can personalize their services according to your exact needs. Additionally, they should be capable of delivering these services within a reasonable timeframe.

## WHAT DOES THEIR QUALITY ASSURANCE PROCESS LOOK LIKE?

The selected powder coating service provider should have a stringent quality assurance (QA) program in place to ensure that the coatings they provide will meet your functional and aesthetic requirements. Things to look for include methyl ethyl ketone (MEK) rub test and coating thickness test capabilities. These assessments help to ensure that the coating will adequately protect the component in its intended operational environment.



# Choose Powder Coating Services at US Metal Crafters

Looking for a powder coating service provider for your next project? Turn to the experts at US Metal Crafters! With over **32 years of combined industry experience** and **over 120,000 square feet** of production capabilities, you benefit from our:

- **Broad in-house capabilities.** At US Metal Crafters, we are able to handle all stages of part production, from fabrication to finishing. We provide a range of standard and custom coatings.





- **Advanced equipment.** Our unique powder coating oven features perpendicular and angular heating panels, which enables us to accommodate simple to complex components, such as angular and hard-to-reach parts. A key feature of our oven is that it is infrared, which enables parts to move through the line faster and require less energy consumption (as only the surface needs to be heated to cure). Conventional ovens require the entirety of the part to be heated, and thus the curing process is longer and less controllable. We also have a dual automatic wash station (with a manual option when dictated by the part), as well as an automatic blow-off.
- **On-time delivery guarantee.** We provide an on-time delivery guarantee for both standard and custom coatings. Custom coatings can be sourced within days.
- **Stringent quality assurance process.** Our powder coating manager is a NACE coating certified inspector. They have designed and implemented a stringent quality control process that includes a MEK rub test and a coating thickness test, which ensures your finish is exactly what you are looking for.

Whether you're local to our Archdale, North Carolina facility, in another part of the USA, or in another country, we can meet your powder coating needs. To learn more about powder coating or our capabilities, [reach out to us](#) or [request a quote](#) today.







## About Us

US Metal Crafters provides a full-service, simplified approach to the metal crafting industry. Combining services for laser cutting, metal stamping, roll forming, fabrication, assembly, powder coating, and an in-house tool and die shop we are one of the few American manufacturers that can provide you a diverse offering of services under one roof.

With over 32 years of combined industry experience and over 120,000 square feet of production capabilities, we are uniquely positioned to advance your business.

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