



---

## POWDER COATING PROCESS AS A WHOLE PROCES

## PROCES PRÁŠKOVÉHO NANÁŠANIA AKO CELOK

Anton PANDA - Marek JANČÍK - Iveta PANDOVÁ

---

### **Abstract:**

Powder coating is a dry finishing process that has become extremely popular since its introduction in North America over in the 1960s. Representing over 15% of the total industrial finishing market, powder is used on a wide array of products. More and more companies specify powder coatings for a high-quality, durable finish, allowing for maximized production, improved efficiencies, and simplified environmental compliance. Used as functional (protective) and decorative finishes, powder coatings are available in an almost limitless range of colours and textures, and technological advancements have resulted in excellent performance properties.

### **Key words:**

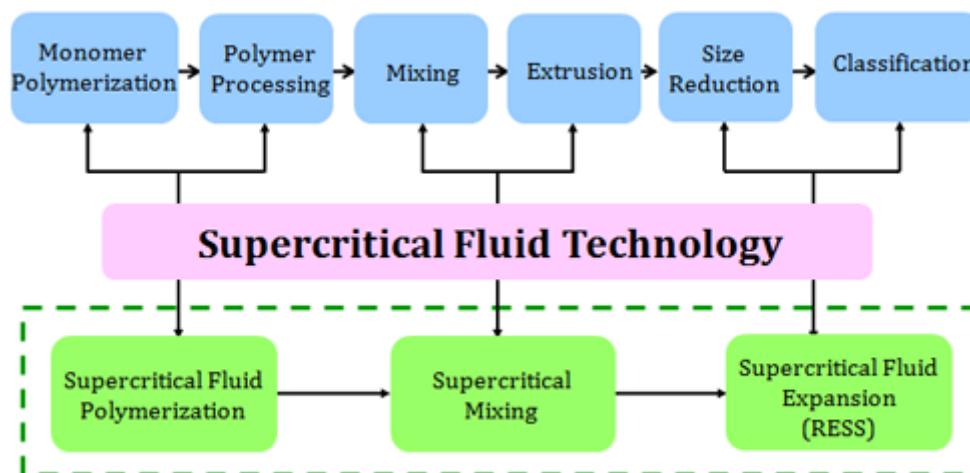
Powder coating, Process, Product, Production

---

### **Introduction – powder coating process**

Powder coatings are based on polymer resin systems, combined with curatives, pigments, leveling agents, flow modifiers, and other additives. These ingredients are melt mixed, cooled, and ground into a uniform powder similar to baking flour. A process called electrostatic spray deposition (ESD) is typically used to achieve the application of the powder coating to a metal substrate. This application method uses a spray gun, which applies an electrostatic charge to the powder particles, which are then attracted to the grounded part. After application of the powder coating, the parts enter a curing oven where, with the addition of heat, the coating chemically reacts to produce long molecular chains, resulting in high cross-link density. These molecular chains are very resistant to breakdown. This type of application is the most common method of applying powders. Powder coatings can also be applied to non-metallic substrates such as plastics and medium density fibreboard.

Sometimes a powder coating is applied during a fluidized bed application. Preheated parts are dipped in a hopper of fluidizing powder and the coating melts, and flows out on the part. Post cure may be needed depending on the mass and temperature of the part and the type of powder used. No matter which application process is utilized, powder coatings are easy to use, environmentally friendly, cost effective, and tough. [3]



**Fig. 1 Processing steps in powder coating process [2, edited and supplemented by author]**

## 2. Durability of powder coating process

Powder coating is a high-quality finish found on thousands of products you come in contact with each day. Powder coating protects the roughest, toughest machinery as well as the household items you depend on daily. It provides a more durable finish than liquid paints can offer, while still providing an attractive finish. Powder coated products are more resistant to diminished coating quality as a result of impact, moisture, chemicals, ultraviolet light, and other extreme weather conditions. In turn, this reduces the risk of scratches, chipping, abrasions, corrosion, fading, and other wear issues. [1]

## 3. Benefits of powder coating process

Many issues inherent in liquid finishing are eliminated or minimized with the powder coating process. Liquid finishes contain solvents, which have pollutants known as volatile organic compounds (VOCs). Powder coatings contain no solvents and releases negligible amounts of VOCs into the atmosphere, if any. Thus, there is no longer a need for finishers to buy costly pollution control equipment, and companies can comply more easily and economically.

The benefits of powder coating for consumers are simple: powder coating will make your purchase look better and last longer – not to mention its reduced environmental footprint.

Powder coating is already found on thousands of products that you come in contact with every day. From bulldozers and chainsaws to your coffee machine and child's crib, powder coating protects the roughest, toughest machinery as well as the household parts that you depend on daily. [2]

## 4. Key markets and applications

- Agricultural and construction:
  - Grain storage systems
  - Tractors
  - Trailers



- Cranes
- Ploughs
- Earth moving equipment
- Fork lift trucks
- Appliance:
  - Gas and electric ranges
  - Refrigerator doors and shelves
  - Washing machines and dryers
  - Freezers
  - Water heaters
  - Vacuum cleaners
  - Kitchen appliances
  - Microwave ovens
  - Garbage disposals
  - Dishwashers
- Architectural:
  - Aluminum doors/windows
  - Curatin walls
  - Facades
  - Shutters and louvers
  - Bathroom fixtures
  - Mailboxes
  - Ornamental Fencing
  - Aluminum extrusions
  - Metal gutters
  - Downspouts
  - Guard rails
  - Structural steel
  - Highway signs
- Automotive and transportation:
  - Primers
  - Wheels
  - Bumpers
  - Window trims
  - Door handles
  - Windshield wipers
  - Steering wheels
  - Radiators
  - Suspension systems
  - Oil/air filters
  - Shock absorbers
  - Valve covers
  - Brake assemblies
  - Luggage racks
  - Mirror brackets
  - Ashtrays
  - Truck seat frames
  - Battery trays



- Chassis
- Electrical:
  - Motor windings and housings
  - Transformers
  - Switch gears
  - Electric junction boxes
  - Electric connectors
  - Electrical cabinets
  - Lighting fixtures
  - Computers
  - Telecommunications
- Other:
  - Medium density fiberboard
  - Plastic
  - Glass [3]

## Conclusion

The result of choosing a powder coated product is that it will have the most attractive, durable, high-quality finish available.

The powder coating process itself offers another advantage – it is environmentally friendly and virtually pollution-free. Unlike liquid paint, no solvents are used in powder coating, so only negligible amounts of VOCs are released into the air. In addition, unused or oversprayed powder can be recovered, so any waste is minimal and can be disposed of easily and safely.

## References

- [1] S. Lee et al., "Polymerization, Compatibilized Blending, and Particle Size Control of Powder Coatings in a Supercritical Fluid", U.S. Patent No. 6,340,722 (issued January 22, 2002).
- [2] S. Lee et al., "Polymerization, Compatibilized Blending, and Particle Size Control of Powder Coatings in a Supercritical Fluid", U.S. Patent No. 6,849,678 (issued February 1, 2005).
- [3] Materials provided by company (The Powder Coating Institute).

## Contact address

(1.) prof. Ing. Anton Panda, PhD.

Technical university in Košice, Faculty of manufacturing technologies with the seat in Prešov, Štúrova 31, 080 01 Prešov, Slovakia

e-mail: anton.panda@tuke.sk

(2.) Ing. Marek Jančík, PhD.

SPINEA s.r.o., Okrajová 33, 080 05 Prešov, Slovakia

e-mail: marek.jancik@spinea.sk

(3.) RNDr. Iveta Pandová, PhD.

Technical university in Košice, Faculty of manufacturing technologies with the seat in Prešov, Bayerova 1, 080 01 Prešov

e-mail: iveta.pandova@tuke.sk