

# | Powder Coating | Technology

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## Powder Coating Technology

Powder coatings are solvent-free and are comprised of solid synthetic resins, pigments and special additives. They are perfectly suited for use as high-quality coatings of metal substrates in the construction industry. Since the early 1960s, industrial powder coating technology has developed into a viable alternative to liquid coatings.

Powder coatings are manufactured in three steps: pre-mixing of raw materials, extrusion and micronization, which results in a fine powder. The powder particles are then processed into a certain size distribution.

In contrast to liquid coatings, powder coatings do not contain solvents. Powder coatings are applied by means of electrostatic spray-guns, then melted and chemically cross-linked at workpiece temperatures of between 320 to 400 °F (160 and 200 °C). The resulting coating has thermosetting qualities, meaning that curing forms an irreversible chemical bond, in contrast to thermoplastic materials.

The resulting powder coating films can withstand the most extreme conditions and are adaptable to a wide range of both functional and decorative purposes.

In contrast to liquid paints, powder coatings can be used to obtain coating thicknesses of approximately 2 to 4 mils (50-100 µm) in a single application. With preheated workpieces coating thicknesses of up to 300 µm are possible. In the case of liquid paints dry films with a maximum thickness of only 1.2 mils (30 µm) can be obtained with a single coat.

The efficiency of application with powder coatings is up to 98%, as overspray is recovered to be reused. By comparison, the average material efficiency with liquid coatings is only 35%, as any solvent-based overspray cannot be recovered.

Powder coatings are factory-applied in contrast to on-site painting. This allows the application of powder under controlled conditions thus minimizing the risk of defects and imperfections. Furthermore, industrial production makes the process independent from weather and temperature.

### Environment | CO<sub>2</sub> Footprint

Today, as the world's climate change continues, environmental aspects of coating systems are of great impact and importance, too. Considering industrial coatings of metal substrates, powder coatings already make a significant contribution toward establishing a sustainable coating industry. With its technological breakthrough in new application areas such as wood-based products, glass and plastics, TIGER makes worldwide efforts to go beyond the powder coating of traditional metal substrates. Read more in the "Product Innovations" section.

Powder coatings are solvent-free and therefore extremely friendly to the environment. Powder application does not pollute the air and does not contaminate soil or groundwater.



In order to understand the full impact that the choice of coatings has, a thorough understanding of its carbon footprint is necessary. Consumed raw materials of the coating, energy spent during manufacture and application are considered and transferred to CO<sub>2</sub> emissions.

The DSM Study "Carbon Footprint for Industrial Coatings applied on Metal Substrates" provides a comprehensive evaluation, taking into account all elements of the coating and coating process. [www.dsm.com](http://www.dsm.com)

### Pretreatment

All substrates require proper pretreatment, the process used depends on the type of material, the specific application, climate and environment. For exterior application an appropriate pretreatment of the substrate is essential.

For environmental reasons, chrome-free chemical pretreatments are increasingly important because of the toxicity concerns of the hexavalent chrome (= Cr<sup>6+</sup>). TIGER provides powder coatings fully compatible with chrome-free pretreatment systems and in conformity to GSB, QUALICOAT and AAMA industrial coating standards.

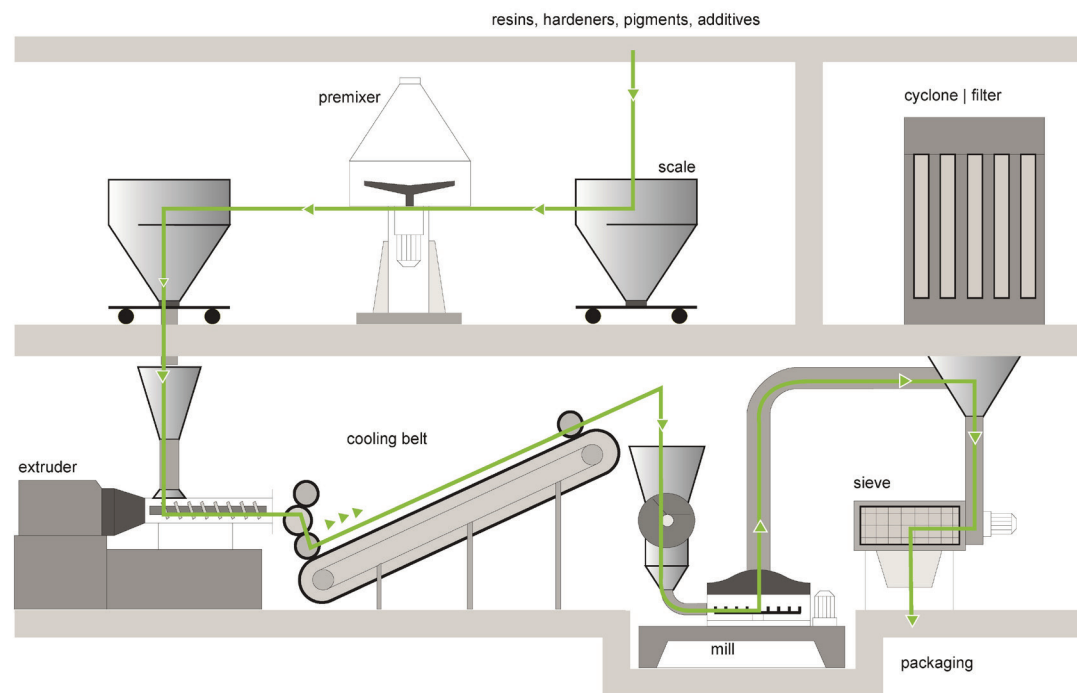
### Advantages offered by Powder Coatings - Overview

- Environmentally friendly because powder coatings are solvent-free
- Application of a single coat can achieve a thickness of approximately 2 to 4 mils (50 to 100 µm)
- High mechanical resistance
- Excellent edge protection
- Optimum results after application of a single coat
- Efficient use of material - up to 98% - due to recovery of overspray
- Economic solution in terms of material usage and application costs

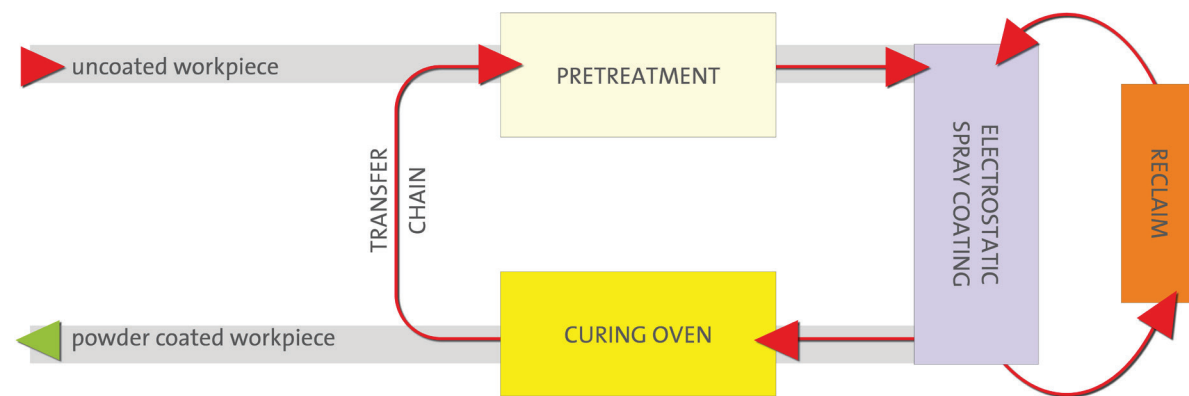
## Powder Coating Production Process

RESINS, HARDENERS, PIGMENTS, ADDITIVES

### TIGER Drylac® Production



## Powder Coating Application Process



### References for more detailed information on Powder Coating Technology

- “POWDER COATING, The Complete Finisher’s Handbook” by Nicholas P. Liberto, published by PCI, The Powder Coating Institute, USA
- “POWDER COATING, Terms & Definitions” published by PCI, The Powder Coating Institute, USA
- “Powder Coater’s Manual” by Roger Talbert, published by Vincentz, Germany
- “Powder Coatings Chemistry and Technology” by Pieter Gillis de Lange, published by Vincentz, Germany
- “Powder Coatings – Chemistry and Technology” by Emmanouil Spyrou, published by Vincentz, Germany
- “Architectural Powder Coatings: A Standard and Performance Comparison” by Thomas Schmidt, Richard Baumberger, TIGER Coatings, published by Atlas Sun Spots Magazine