



Powder Coating Kitchenette

Fundamentals of Powder Coatings

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Agenda:



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- Introduction, Nomenclature, and Raw Materials
- Formulating and Processing
- Application
- Evaluation and Testing



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- A Neat Idea – 1953 (Erwin Gemmer)
- Clean Air Act – 1970 (EPA)
- Hazardous Waste – RCRA – 1976
- Efficient – Reclaimable
- Energy – No Solvent Flash-off
- Excellence – High Performance

Economical



How We Got Here

Binder Components:

- **Polymer**
Classes of compounds comprised of molecular chains of specific monomers.
Examples: GMA Acrylic, Epoxy, Carboxyl Polyester
- **Resin**
Specific products with tradenames and product codes.
Examples: Almatex PD-7690, DER-6155, Crylcoat 2441
- **Crosslinker**
Oligomer possessing two or more reactive chemical groups
Synonyms: “curing agent” and hardener.
Examples: TGIC, Alcure 4430 (blocked isocyanate), Epikure PT-108 (accelerated DICY)
- **Binder**
The resinous component that provides the film-formation of the coating.
Includes resin, crosslinker and binder additives (e.g. catalyst, flow agent, and degassing agent).

Additives: Non-Reactive

- Flow Agent

Minimize cratering defects by equalizing the surface tension differential of binder components. Flow agents can also enhance flow and leveling.

- Degassing Agent

Accommodates the expulsion of interstitial air and other volatiles (blocking agents, water, etc.) during the film formation.



Additives: Reactive

- Catalyst

Increases the rate of a chemical reaction.

Synonym: Accelerator

Examples: 2-methyl imidazole, dibutyl tin dilaurate, tetra-butyl phosphonium bromide

- Antioxidant

Reduces polymeric degradation caused by heat.

Examples: Hindered phenols (1°), Organo-phosphites (2°)

- UV Absorber, Light Stabilizer, “Smart” Additives



Colorant Pigments

Inorganic

- Less clean, Higher S.G., Lower cost
- Simple Metal Oxides - Fe_2O_3 , TiO_2
- Calcined Mixed Metal Oxides - CoAl_2O_4 , $(\text{Ti,Sb,Cr})\text{O}_2$

Organic

- Brighter, Cleaner, Lower S.G., More Expensive
- Carbon Black
- Phthalo Blue, DPP Red

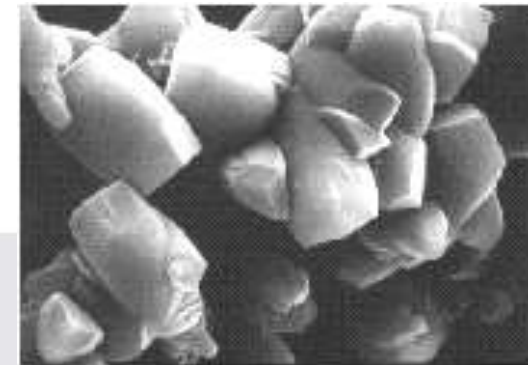
Effect Pigments: Metallics, Pearlescents



Extender Pigments

Inorganic compounds used to reduce cost without influencing color or opacity.

- Usually affect other coating properties
- Naturally occurring minerals or...
- Synthetic compounds
- Synonyms: Extender, filler.
- CaCO_3 , BaSO_4 , Wollastonite

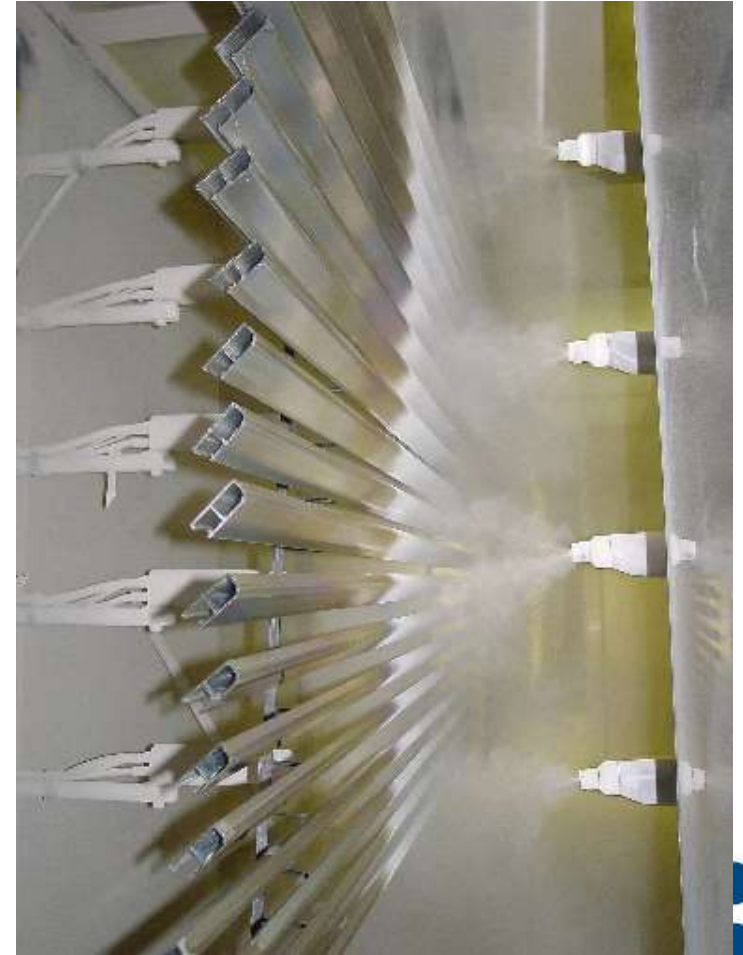


Synthetic CaCO_3

Fluid Flow Additives

Post-add to enhance handling properties - fluidity.

- Fumed SiO_2 or Al_2O_3
- Added during grinding phase of manufacturing
- Synonyms: Dry-blend additive, fluidization agent and anti-caking agent.



Summary

Powder Coatings have been around for decades because of their environmental attractiveness, high performance and economics.

Powder Coatings are comprised of:

- Binder (resin + Crosslinker)
- Additives
- Colorant Pigments
- Extenders
- Process Aids

