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Coil Coating Glossary

A. Purpose

This technical bulletin presents definitions of terms commonly used throughout the coil coating industry.

B. Introduction

The vocabulary of the coil coating industry includes terminology taken from both the coil coating processing and paint industries. This glossary contains definitions of terms in common use throughout the industry; however, the list is not exhaustive, and no effort has been made to identify every synonym for a specific term.

C. Details

Accumulator—a series of fixed and movable rolls which provides a reservoir of strip during coil coating and other continuous strip processing operations. Accumulators are found at both the beginning and end of a coil coating line. They are used to keep the line running while coils are attached at the entrance end or removed from the exit end. The entry accumulator is kept full; this accumulator provides metal to the line while a new coil is being attached. The exit accumulator is kept empty; this accumulator fills while a finished coil is removed from the line.

Adhesion—the phenomenon by which one material is attached to another by means of surface attraction. Bonding strength of the coating to the substrate.

Applicator roll—in roll coating, the roll that applies the paint, conversion coating, or other liquid coating to the moving strip of metal.

Backing coat (backer coat)—a thin functional coating applied to the back or unexposed side of coil coated metal. The backing coat is applied for such reasons as appearance, durability, lubrication during roll forming operations, insulation, bonding, and protection of the topcoat. A backing coat should not be confused with a **wash coat** (See “Wash Coat”).

This Tool Kit is part of a series of educational aids developed by the members of the National Coil Coating Association. NCCA is a trade association of coil coaters and suppliers of raw materials and equipment used in the coil coating process. The association concentrates its efforts on providing educational resources and assisting its members in providing superior products and services to their customers. NCCA Tool Kits are informational tools and should not be used as substitutes for instructions from individual manufacturers. Always consult with individual manufacturers for specific instructions regarding their products and equipment.

Baffle—a device used to deflect material flow in a desired direction. In the coating pan, baffles are used to both direct the flow of paint to the pick-up roll, and also to direct air bubbles away from the pick-up roll. Baffles are also used in ovens to direct airflow.

Bleed over—see **slopping over**.

Blister—a raised spot in a paint film or other coating, caused by the expansion of gas in or under a coating.

Blocking—the sticking of a layer or wrap of a painted coil to an adjacent layer or wrap.

Block marks (sometimes referred to as Friction Scratches or Pick-off)—short longitudinal scratches introduced during coiling or rewinding, resulting from relative movement between adjacent wraps of the coil.

Body—the viscosity or consistency of a paint.

Bridle—a series of rolls that provides a controllable amount of tension and/or driving force to the metal strip in a coil coating line.

Burr—a thin ridge of roughness left by cutting operations such as shearing, slitting, trimming, blanking, etc.

Camber—the deviation of a side edge (of metal strip) from a straight line. Camber is measured on a concave side using a straight edge. Long lengths of unsupported strip having a large amount of camber tend to deviate from the horizontal or slope to one side. Also referred to as lateral bow.

Center (crown)—the difference in thickness between the middle and edges of a sheet.

Center stretch (center buckle, full center, snap buckle)—a phenomenon that occurs when the center of the metal strip is longer than the edges, so that the strip is not flat. See also **oil can**.

Chalk—the degradation of a paint film by gradual erosion of the binder. This erosion is indicated by the presence of powdery "chalk" on the surface of the paint after weathering.

Chatter—a series of transverse marks or lines on metal strip. Chatter marks can appear on both bare and painted metal. They are usually caused by vibration of the coating rolls, strip, or an eccentric roller.

Clock spring—the slipping action of a coil wrap on an adjacent wrap during uncoiling or recoiling.

Coater—see **roll coater**.

Coating weight—see **deposition weight**.

Coil set—longitudinal curving or curling of the strip to the shape of the coil.

Cold rolled steel—steel that has been rolled in a cold-rolled process (as opposed to a hot-rolled process) to specific thickness and flatness specifications.

Concentric roll—a perfectly round roll; a roll having all points on the circumference equidistant from the axis of the roll.

Conversion coating (pretreatment)—a chemical treatment typically applied to the metal strip after cleaning and before final finishing. Conversion coatings chemically modify the metal surface and make it suitable for painting or adhesive bonding.

Core Liner or Core—cardboard "spool" onto which a coil of steel may be wound. The core liner provides protection to the inner laps of the coil from handling damage.

Cratering—a coating effect characterized by small pock marks or depressions surrounded by a ring of coating material that projects above the general plane of the coating. In severe cases, the substrate may be visible in the center of the defect.

Cure—the process by which paint is converted from the liquid to the solid state. Two phenomena normally occur during the curing process: 1.) evaporation of solvents, and 2.) polymerization and/or cross-linking of the paint resin(s).

Crown—see **center**.

Deposition weight (coating weight)—the amount of conversion coating or other material deposited by a metal treatment process. Deposition weight is usually expressed as mass per unit area of metal surface (milligrams per square foot, grams per square meter).

Direct coating—a version of the roll coating process where the applicator roll revolves in the same direction as the travel of the strip. Direct coating is also referred to as forward coating.

Durometer hardness tester—an instrument used to characterize the hardness of elastomers or other rubber-like materials. Durometers are commonly used to measure the hardness of roll coverings and heavy plastic films, such as plastisols. Test results are displayed as a percentage of scale deflection from zero to 100 for any given scale employed. The "A" scale is most commonly used.

Dross or Dross Beads—circular bumps that appear on the surface of galvanized steel.

Embossed sheet—see **patterned sheet**.

Exudate—a component of a coating that migrates to the surface during curing or storage, or after final installation.

Fade—the gradual loss of color of a paint film due to a chemical or physical change. Usually due to pigment degradation by the ultraviolet radiation in sunlight.

Fast solvent—a solvent that evaporates quickly.

Fish eye—an elongated crater-type coating defect that may have a particle in the center. See also **cratering**.

Flag—a marker inserted adjacent to the edge of a coil to mark a splice or defect.

Floating—a process of pigment separation (**flooding**) in which the final color is not homogeneous; e.g., it may be streaked, spotty, or otherwise nonuniform.

Flooding—the separation of one or more pigments in a coating during curing, so that a non-uniform or unintended color is produced.

Flop—the term used when two painted panels appear to match in color when viewed at one angle, but do not match at other angles, or when one panel changes color as the viewing angle changes. Flop is normally associated with metallic color or **metalescent (pearlescent)** coatings.

Flow—the property of a paint that manifests itself in the degree of leveling, or in an ability to move under applied stress.

Flow lines—lines on the surface of painted sheet, caused by either incomplete leveling of the paint or telegraphing of imperfections (flow lines) on the metal surface.

Forward coating—see **direct coating**.

Friction scratches—see **block marks**.

Full center—see **center stretch**.

Gage (gauge)—the thickness of sheet metal; also, a dimension expressed in terms of a system of arbitrary reference numbers. Gage designations were formerly used to describe the thickness or weight per unit area of thin plate, sheet, and strip or the diameter of rod and wire. The use of absolute (SI or English) units is preferred.

Galvalume—steel that has been coated with a zinc/aluminum alloy to improve corrosion resistance. The coating is applied by passing cold rolled steel through a bath of molten zinc/aluminum.

Galvanneal—hot dip galvanized steel that has been heat-treated or annealed to create a zinc-iron alloy layer on the surface to improve weldability and paintability.

Gloss—the degree to which a surface reflects light.

Hardness pencil—a tool used to evaluate the hardness of a cured paint film. Each of a series of mechanical or wooden drawing pencils is sanded to a flat point, then held at a 45° angle and pushed forward and downward against the test sample. The hardness designation of the pencil that just fails to cut the film is the pencil hardness of the film.

Hide—the ability of a paint to hide the substrate in relation to the quantity of the paint that is applied.

Hot dip galvanized steel (HDG)—steel that has been coated with zinc to improve corrosion resistance. The zinc coating is applied by passing cold rolled steel through a bath of molten zinc.

Journal—the end of a roller, which slips into the bearings. The journals ride on the bearings as the roller is revolved.

Lateral bow—see **camber**.

Leveler (roller leveler, tension leveler)—an apparatus consisting of a series of steel rolls which flatten or level a metal strip as it passes between them.

Leveling—the phenomenon by which paint flows out after application to minimize surface irregularities and produce smooth surface. Also, the process of flattening metal strip.

Live center—a point at the very center of each end of a roll. This is usually the center of the journal. The roll is driven from this point, and is considered concentric from the same point.

Metal marking—black or gray marks left on a painted strip when bare metal is drawn across its surface. White and light-colored coatings are more susceptible to metal marking than dark coatings. Metal marking typically occurs during forming operations.

Metalescent (pearlescent)—having the appearance of bright metal.

Metamerism—The phenomenon of colors matching under one light source but not under another. It is detected by comparing the colors under two different light sources, such as daylight and incandescent lamp light.

Metering roll—in roll coating, the roll used to apply a uniform coating of paint, conversion coating or other liquid coating to a transfer roll or applicator roll.

Micrometer—an instrument that can be used to measure thickness. Typically used to measure the dry film thickness of paint and the thickness of metal strip.

Migration—the movement of a constituent from within a paint film to another part of the film, the surface, or to another film in direct contact.

Mil—one-one thousandth of an inch (0.001 inch). This unit of measure is frequently used for paint films. One mil equals 25.4 microns.

Night strip—see **starter strip**.

Oil can—a localized out-of-flat condition, often observed as buckles toward the center of an otherwise flat strip. See also **center stretch**.

Orange peel—a paint defect where the surface resembles the skin of an orange; also, surface roughening on formed products resulting from the use of coarse grained material.

Paint—a liquid composition, usually pigmented, that is converted to a solid film after its application as a thin layer.

Pan—in roll coating, an open container used as the coating reservoir. The pick-up roll revolves in the pan, picks up paint or conversion coating, and transfers it to an applicator roll.

Patterned sheet (embossed sheet)—sheet on which a pattern has been impressed on one or both sides by rolling the strip between patterned (embossing) rolls.

Pick-off (sometimes referred to as Friction Scratches)—the tendency of a paint to be picked up in very small pieces from one side of a painted strip and held by the coating on an adjacent wrap of the strip. It also refers to the transfer of coating material to tension and bridle rolls, and the transfer of loose paint or coating to tape in forming tests.

Pick-up roll—in roll coating, the roll that revolves in the pan. The pick-up roll is partially submerged in the paint, conversion coating, or other liquid coating, and moves the coating from the pan to the transfer or applicator roll.

Pits—very small craters that extend to the metallic substrate.

Polishing—an apparent increase in paint film gloss caused by the rubbing of the top and backing coats during the recoiling of a strip, or by contact with roll forming equipment or other smooth moving objects.

Popping—a paint defect resembling fine blistering. Popping is usually caused by organic solvents trapped during the film cure.

Pretreatment—see **conversion coating**.

Pressure marking (pressure mottling)—an uneven pattern, often seen as glossy spots, which is usually caused by pressure within a painted coil.

Primer—an undercoating or initial coat of paint designed to improve the paintability of the substrate by enhancing the adhesion of the topcoat to the substrate. Primers are also often formulated with specific pigments to inhibit corrosion of the substrate.

Recoiler—the apparatus used to rewind the strip after it is painted.

Reverse coating—a version of the roll coating process where the applicator roll revolves in the opposite direction from the travel of the strip.

Ribbing—longitudinal streaks that do not flow out on a painted strip.

Roll coater (coater)—an apparatus used to apply paint, conversion coating, or other liquid coating to a strip of metal. The roll coater consists of rolls that (1) support the strip and (2) pick up, meter, and deposit liquid coating onto the metal strip as it moves through the coater. See also **direct coating** and **reverse coating**.

Roll former—a series of revolving metal wheels or rolls that form a continuous strip of metal into various shapes.

Roll grinder—a special lathe used to grind down or resurface rubber applicator rolls.

Roller leveler—see **leveler**.

Roping—see **ribbing**.

Shear—the force acting parallel to the strip at the point where the applicator roll meets the strip. Shear also occurs at all roll-to-roll contact points. Shear also refers to metal cutting equipment.

Skipping—an irregular paint application, usually occurring when improper contact is made between the applicator roll and the strip. See also **starving out**.

Slitting—the process by which wide strip is cut into narrower widths.

Slopping over (bleed over)—a term used when coating used on the top side of a continuous strip finds its way to the bottom side.

Slow solvent—a solvent that does not evaporate quickly.

Snap buckle—see **center stretch**.

Splice—the joint between two coils of metal. (Also referred to as a “stitch”)

Spool—see **uncoiler**.

Starter strip (night strip)—a length of metal threaded through a coil coating line before shutdown. At startup, a new coil is attached to the starter strip and threaded into the line.

Starving out—irregular film thickness. Starving out can be caused by insufficient liquid in the coating pan, adverse reaction of the coating to shear, an improper speed ratio between strip and roll coater rolls, or improper wetting of the rolls by the coating.

Stitcher—a stapling device used to connect the end of one coil to the beginning of another.

Streaking (sometimes referred to as Gloss Lines or Gloss Streaks)—a type of floating manifested as a longitudinal variation in gloss or color; also any line, elongated mark, or stripe causing nonuniform surface appearance.

Tandem line—a continuous coil coating line with two roll coaters. Tandem lines can produce metal with two coatings (primer and topcoat) on each side.

Telescoping—transverse slipping of successive layers or wraps of a coil, so that the ends are conical rather than flat.

Tension leveler—see **leveler**.

Thermoplastic—capable of softening on heating. Thermoplastic (fused) films or coatings are not crosslinked.

Thermosetting—having little or no tendency to soften on heating. Thermosetting (cured or converted) films are crosslinked.

Topcoat—the final paint film applied to a surface.

Transverse bow—curvature across the width of sheet.

Trough—see **pan**.

Transfer roll—in roll coating, the roll that moves paint, conversion coating, or other liquid coating from the pick-up roll to the applicator roll.

Uncoiler—an apparatus used to payoff metal strip at the beginning of a coil line. The uncoiler is also used to control strip tension.

Wash coat—similar to backing coat, except that color, gloss and film thickness are not closely controlled. Often consists of a thin layer of the same coating as the topcoat for which color, gloss and thickness are not closely controlled.

Water cooling (water quench)—the method used to cool the painted strip directly after it leaves the oven. The painted strip is dried before recoiling.

Wavy edge—a rippling departure of an edge from flat.

White rust—residue from the corrosion of Galvanized Steel consisting of white zinc oxide/hydroxide. Also refers to aluminum oxide or “water stain” on aluminum.