Ask the Expert

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By Steve Ladatto, PCI technical director

You have questions, we have answers. In each issue of PCT, our powder coating expert, Steve Ladatto, provides information to help you with your powder coating challenges. Let us know what's keeping you awake at night, and we'll do our best to help you get a good night's sleep!

It Matched—In That Light

We approve parts in the plant, but once the product is installed or viewed under different lighting, the color and finish suddenly look different. Customers say it doesn't match what they approved. Why does this keep happening?

Powder coatings interact with light differently than many people expect, especially compared to liquid paints. Surface texture, gloss level and pigment orientation all influence how light is reflected back to the eye. Even when the color itself hasn't changed, the way light hits the coating can dramatically alter its appearance.

Metallics, low-gloss finishes and textured powders are particularly sensitive. Metallic flakes reflect light directionally, meaning small changes in viewing angle or light source can create large visual differences. Matte and textured finishes scatter light, which can make colors appear lighter, darker or less saturated depending on the environment.

The most common mistake is approving finishes under a single lighting condition. Shop lighting, office lighting, daylight and exterior sunlight all have different color temperatures. A coating approved under cool fluorescent lights may look warmer or duller outdoors even though nothing is wrong with the coating.

The solution is controlled approval, in which critical finishes are evaluated under multiple light sources before final sign-off. Approval panels travel with the project and are referenced consistently when appearance is critical, and lighting conditions are documented during approval to help prevent disputes later.

Color perception is subjective, but the process doesn't have to be. When lighting is accounted for upfront, appearance surprises largely disappear.

Fix the Process, Fix the Profits

We are new to the powder coating job shop business, and we're struggling with profitability. Our quoting is inconsistent, we're missing margin targets on certain jobs and our reject rate is higher than expected. Light coating and orange peel account for many of our rejects, and we also have trouble achieving the throughput we assumed when we quoted the work. Can you offer guidance on quoting methods and the operational issues that affect profitability?

What you're experiencing is very common for new powder coating job shops, and the root cause is usually the same: quoting is being done in isolation from process capability. In powder coating, profitability is not determined by material cost alone. It's driven by how predictable your process is.

Start with quoting discipline, as many shops base quotes on square footage and powder usage while underestimating labor, setup time and yield loss. Light coating and orange peel are not just quality issues; they are profitability killers. Every reject adds rework, consumes booth time and disrupts flow. Those costs must be baked into your quotes until the process is stabilized.

Throughput assumptions are another common trap, as quoted line speeds often reflect "best case" conditions rather than real production. Complex parts, tight cosmetic requirements and frequent color changes slow everything down. If your quote assumes continuous, ideal flow but your process can't support it, margins disappear quickly.

The fix begins with standardization, including clearly defined target film thickness ranges that balance appearance and efficiency. Excessive film-build increases orange peel and slows throughput; insufficient build drives light coating rejects. Both are symptoms of inconsistent gun settings, operator technique or electrostatic control. Lock down parameters train operators for repeatability, not just coverage.

Next, separate jobs by risk. High-appearance work, metallics, thin-gauge parts and tight tolerances should carry higher prices to reflect slower speeds and higher scrap risk. If everything is quoted the same way, your hardest jobs will quietly subsidize your easiest ones.

Finally, track rejects by cause because recurring orange peel and light coating issues provide actionable data. Fixing those two issues alone often unlocks margins without raising prices. In powder coating, predictable processes create predictable profits, and quoting improves only after the process does.

Zinc Needs Special Treatment

We routinely struggle with adhesion when coating galvanized parts, even when steel parts run fine on the same line. What makes galvanized steel so problematic?

Galvanized steel is fundamentally different from bare steel, and treating it the same way almost guarantees adhesion problems. Zinc coatings vary widely depending on the galvanizing process, steel chemistry, bath composition and post-treatment. The surface may contain oils, passivating agents, zinc salts or oxides, all of which interfere with coating adhesion.

One of the most common mistakes is using pretreatment chemistry designed for bare steel. Zinc surfaces react differently and often require specific cleaners and conversion coatings to promote adhesion. Inadequate rinsing or improper dry-off temperatures can also create zinc oxides that weaken the bond between powder and substrate.

Thermal behavior adds another challenge. Zinc expands and reacts differently than steel during heating, and excessive dry-off or cure temperatures can damage the surface chemistry before powder ever flows. The solution requires a galvanized-specific approach: compatible pretreatment chemistry, controlled washer parameters and careful temperature management. Adhesion-promoted powder systems are often necessary, especially for outdoor applications.

Galvanized steel isn't "bad metal," it just demands respect. When processes are adjusted accordingly, reliable adhesion is achievable.

Chain Reaction

I am the maintenance manager at a large metal fabrication plant. We installed a new powder coating line about six years ago, and recently we started having conveyor issues. The conveyor is a closed-type, long oval approximately 660 feet long and the curved portions of the track are showing very significant wear such that the wheels of the chain are dropping through the opening, periodically causing stalling issues. Our take-up has dual 6-inch cylinders that were set at the manufacturer's recommended pressure of 27 psi. Is this considered "normal" wear?

Coating line conveyors are often taken for granted as they quietly toil day-in and day-out carrying parts on a seemingly endless mission. But when problems arise, it's an immediate crisis because the line cannot function without it. The wear depicted in the pictures supplied is not something I consider to be common in nature, but it certainly has an explanation as well as a set of conditions that bear acknowledgment.

The horizontally oriented wheels put pressure on the inner vertical face of the track, especially at the ends where the curves are installed that create the oval shape of the conveyor. The take-up mechanism, which applies a specific amount of tension to the conveyor's chain, plays a significant role here. It appears that despite the take-up cylinders being set to the correct pressure, this setting is applying too much tension to the system which is manifesting in track wear. This condition can be further exacerbated by things like inadequate lubrication of the chain, using non-hardened track components in the non-linear areas of the conveyor, unbalanced loading of the line, and areas of inclination/declination where the elevation of the conveyor changes.

All the curved components on your conveyor must be replaced to correct this condition. Speak with your conveyor supplier about alternative alloys that are hardened before making the repairs. Also, many conveyor experts I've spoken to suggest gradually increasing cylinder pressure on the take-up until a stable setting can be established that facilitates smooth, consistent movement. Also, make sure you're performing an inspection of the track every six months for excessive wear of the track and chain.

A section of the damaged conveyor track is examined and reveals the severe wear path of the bearing. Inadequate metal hardness and excessive take-up tension are likely contributors of this failure. Photo courtesy of The Powder Coating Institute.

Have a question for our powder coating expert? Send it to techdir@powdercoating.org.