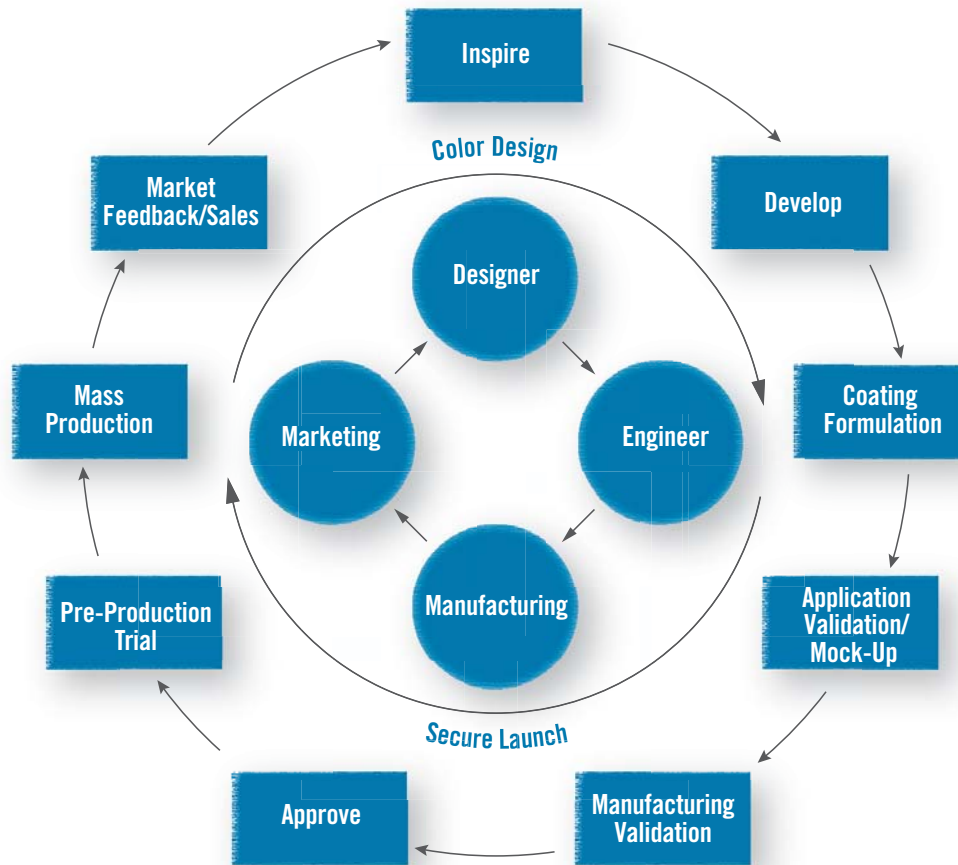


PPG Color Launch Process

Accelerates Timelines for Development and Deployment of Coatings for Consumer Products.



KEY FINDINGS:

The PPG Color Launch Process accelerates color design and lowers the overall risk associated with launched new consumer products.

Color effects and tactile finishes play an increasingly prominent role in product design. Original equipment manufacturer (OEM) designers are under growing pressure, not only to introduce products that look good and function well, but to do it faster and more frequently.

PPG Industries has developed a proprietary *PPG Color Launch Process* to help accelerate the design, formulation and manufacture of customized coatings for consumer products.

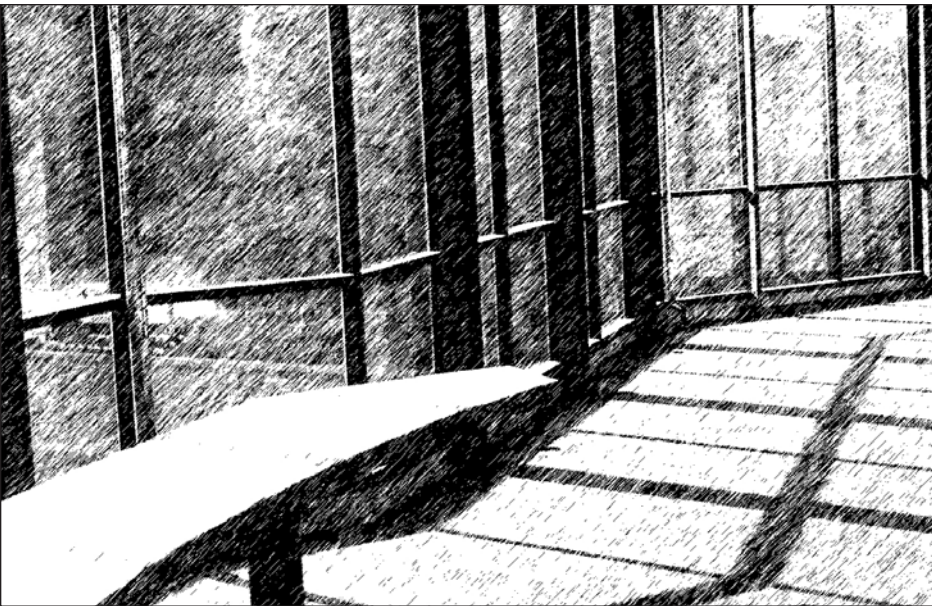
This process effectively bridges the gap between how coatings are styled in the studio

and applied on the manufacturing line. Even more importantly, it integrates seamlessly into existing development and deployment practices of consumer product manufacturers, enabling them to move new products to market faster.

The following document details the *PPG Color Launch Process* and explains how, working in conjunction with an OEM's design and manufacturing teams, it can reduce the time needed to formulate and apply new coating colors and effects for consumer products.

Why PPG Color Design?	<p>The <i>PPG Color Launch Process</i> is unique in the industry because it allows OEM designers to integrate their color ideas with PPG’s knowledge and experience in the earliest possible stages of creative color and product development.</p>
Brainstorming	<p>The color design process starts with a creative brainstorming session between PPG’s color designers and the OEM’s product design, marketing and manufacturing personnel. OEM representatives may come to the initial meeting armed only with product concepts and a target customer in mind.</p> <p>Working together, the PPG and OEM teams jointly review the OEM’s vision for a finished product that can quickly be developed and deployed.</p>
Prototyping	<p>PPG facilitates prototypes by providing materials, model shop support and painted parts so the OEM can visually critique the new colors as they will appear on actual finished products.</p> <p>Colors developed with an OEM as part of the <i>PPG Color Launch Process</i> can be made confidential and exclusive to them at their request.</p>
Southern California USA Design Center	<p>To enhance speed and effectiveness of the <i>PPG Color Launch Process</i>, PPG collaborates with the Shmaze design facility in Southern California. This exclusive partnership allows designers to walk into the design center with an inspiration and out with an actual product prototype, including production-line-painted color targets. Doing so shortens into days a coatings development process that used to take weeks or months to complete.</p> <p>This not only accelerates the color and product design process, but also has the potential to significantly compress the time needed for OEMs to get finished products to market.</p>
Global Collaboration	<p>The <i>PPG Color Launch Process</i> is adaptable to customer processes and time constraints. OEM design teams can interact with PPG as much as they need, either by providing remote direction or by working directly with PPG color designers on-site at PPG’s global color labs as they develop, formulate and apply prototype colors and coatings.</p> <p>The process also can be structured to overcome the challenges of global design teams that need to work “virtually” due to travel and time constraints. By electronically linking multiple PPG and OEM locations, the process can easily support the creation of synchronized global color design workshops.</p>

Southern California Design Center



PPG and Color

PPG is one of the world's leading manufacturers of architectural, aerospace, automotive and industrial coatings and paints. The company's experience across a breadth of industries gives it a broad, international view of color that cannot be emulated by competitors who operate in narrower business silos.

OEMs who employ the *PPG Color Launch Process* gain the full advantage of PPG's globally recognized expertise as a color forecaster, as well as the company's ability to develop colors and coating technologies for a broad range of manufacturing applications and environmental conditions.

By harnessing PPG's manufacturing and trend-spotting capabilities, the *PPG Color Launch Process* facilitates collaboration between the OEMs product design and manufacturing teams early in the product development process. Ultimately, that minimizes the delays that typically occur in conventional product development processes as new products transition from concept to actual manufacture.

Following are the seven steps of the *PPG Color Launch Process*, including details on how it benefits OEMs who rely on customized coatings to give their products a signature look and feel.

Stage 1: Color Design

To successfully introduce new colors and finishes for mobile devices, computers and other products, OEMs typically have to overcome two barriers. The first is to accurately predict design success. The second is to transfer the finish from concept to the manufacturing line.

A particular color, metallic effect or gloss may be achievable in the design studio, but the potential for mass production may be limited by access to raw materials or lack of proper equipment. This is particularly true for manufacturers whose products involve a complex global supply chain.

PPG's color professionals understand color technology and coatings capabilities.



Styling Workshops

Stage 1 of the PPG Color Launch Process aims to overcome these barriers through hands-on styling workshops that incorporate input from the OEM design and manufacturing teams. In these workshops, PPG works closely with OEM designers to generate color ideas and uses its in-house stylists and color experts to facilitate the creative process.

PPG's color professionals understand color technology and coatings capabilities, as well as color trends and the cultural, technological and demographic factors that influence them. As a result, instead of relying on intuition, OEM designers and manufacturers have the opportunity to integrate "informed creativity," into their product development scheme, with the goal of expediting the design process and enhancing the odds for ultimate success in the marketplace.

Stage 2: Formulation Development

This stage is devoted to developing approved coatings that meet the aesthetic and performance standards established by the OEM, and to creating published master standards for each coating that can be circulated to the OEM, original design manufacturer (ODM) and the coatings applicator(s).

The first step in this stage is to refine the formulas for each color/coating developed in *Stage 1*. The goal is not just to match the colors generated in the OEM design workshop, but to ensure that formulations meet their required performance specifications and color tolerance limits.

Supply Chain Checklist

To further facilitate this process, the *PPG Color Launch Process* incorporates a *Supply Chain Checklist* to ensure that coatings can be adequately sourced by the OEM at its applicator facilities. Because paint formulations from local companies around the world vary widely, the *Supply Chain Checklist* helps OEMs achieve the global quality of finish they specify when and where it is needed.

Design of Experiment

Once a target color or aesthetic has been identified, the next step is to gauge its manufacturing viability. To do so, PPG creates a *Design of Experiment* (DOE) which examines the film builds and spray parameters associated with a selected coatings formulation.

Using statistical tools, PPG evaluates the coating's appearance and performance properties, and measures how the actual formulation and application of the coating affects the variability of those properties.

Designed with input from the OEM and its applicators, the DOE also examines how prospective coatings should be formulated and applied to maximize performance. For instance, PPG may test multiple coating formulations to assess how the quantity of raw materials, and in which order they are mixed, can affect coatings performance.

The purpose of this stage is to ensure that the coatings developed for the OEM are engineered to meet performance requirements and special requirements of the specific application line. Because this stage involves

rigorous, data-driven analysis, it allows online adjustments for coatings formulations to be made earlier in the development process. This minimizes the potential for reformulations that could delay a product launch.

Stage 3: Application Validation

In *Stage 3*, approved coatings are made fully compatible with the OEM's line applicators and systems.

This stage begins when a member of the PPG product launch team visits each applicator production line to conduct a compatibility assessment. Once compatibility has been confirmed, the OEM, ODM or applicator can provide PPG with production substrate(s) of its targeted end-product.

PPG tests prospective coatings on a simulated applicator line to measure how variations in humidity, film build and wetness or dryness can affect their ability to be applied or adhere to a substrate.

Using the production substrate, PPG designs a series of pre-trial experiments, known as the *Workability DOE*, to simulate the OEM's actual production process and to evaluate the coatings' performance on their applicator lines.

Experimental parameters encompassing variables such as atomization, fan control pressure, film build range, humidity changes and spray-gun operation are rigidly controlled and measured via statistical analysis to quantify and enhance the robustness of the coatings.

Stage 4: Manufacturing Validation

In *Stage 4*, PPG works with the OEM's manufacturing department to produce and deliver initial coating samples to the finish applicators.

Although *Manufacturing Validation* is a standard procedure in the development of a coating, the *PPG Color Launch Process* makes it more comprehensive and rigorous by employing an innovative, automated tracking system that assigns key personnel to the completion of critical tasks. The system tracks each task required to successfully validate the manufacturing viability of a coating.

Next, PPG blends and validates a trial batch of the coating which is then shipped to the OEM and its applicators for *Stage 5*.

Stage 5: Pre-Production Trial

The *Application Validation* process in *Stage 3* is designed to test the formulation of the coating in a simulated manufacturing environment. In *Stage 5*, testing moves to the OEM's actual production lines where it is validated and parameters are established for mass production of the coating.

Stage 5 begins with a pre-trial planning meeting that typically includes the OEM, ODM, product design team, applicator and PPG launch team. The purpose of this meeting is four-fold:

1. Establish goals for the trial,
2. Define the trial process,
3. Identify key data to be collected to evaluate the trial's success, and
4. Assign roles and responsibilities to each stakeholder to ensure success.

Once a plan is formulated, the actual trial run takes place. Production-quality parts are manufactured on the applicator line and key data such as color consistency, color quality, gloss and finish appearance, gun type, coating viscosity, humidity, blend ratios and fluid pressure are continuously monitored by the team.

When the trial run is complete, a comprehensive production report and sample parts are delivered to the OEM for final review. Once the trial parts and coatings are approved, the process moves to *Stage 6, Mass Production*.

Stage 6: Mass Production

Stage 6 of the *PPG Color Launch Process* evaluates the application of the finished coating in mass production. At this point, PPG conducts a meeting with all stakeholders to review plans. In addition, the applicator confirms its coating demand requirements. The goal of *Stage 6* is to anticipate and accommodate potential shifts in demand to ensure a seamless manufacturing operation.

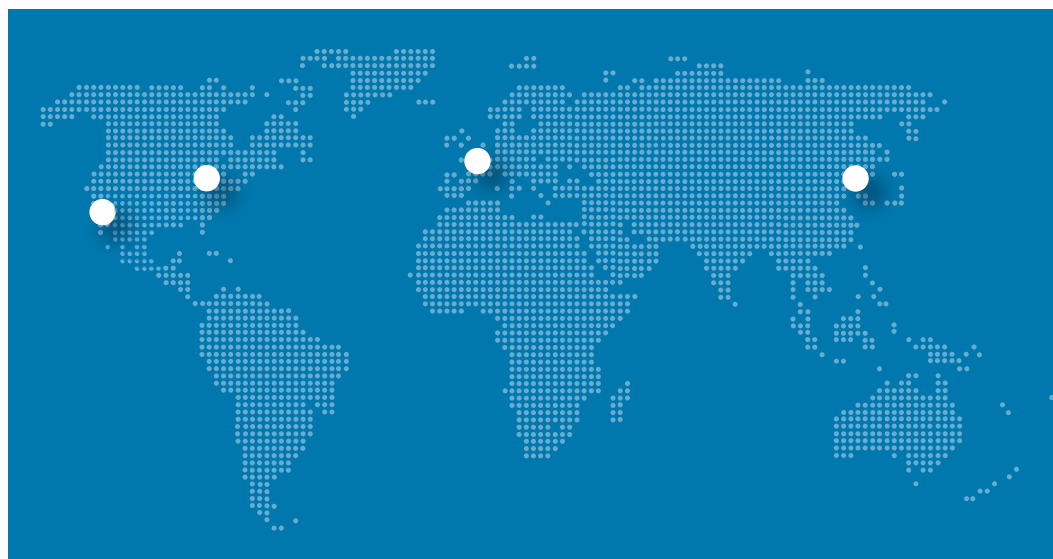
Stage 7: Feedback/ Inspiration

Once a product is launched, PPG experts are available to meet with OEM marketing and design staff to celebrate program success, monitor inventory volumes and preview the next generation of color trends and coatings technology. The *Feedback/Inspiration “Stage”* serves not only as the last step of the *PPG Color Launch Process*, but also as the first in an eco-system of continuous improvement and innovation.

Conclusion

The *PPG Color Launch Process* was developed not just to improve and accelerate the color design and product launch process, but to lower the overall risk associated with launching new consumer products. The *PPG Color Launch Process* brings together supply chain partners to spark creativity, communicate ideas and increase profitability. To learn how the *PPG Color Launch Process* can help your company, visit www.ppgindustrialcoatings.com, or call 888-774-2001.

Global PPG Color Design Locations





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