

Creating with Color Confidence

Designers, photographers, filmmakers, and content creators need to trust that their work's color design intent is accurately realized by colleagues, suppliers and target customers. But in today's world, where most creative work is produced digitally and viewed on an artist's display, while others view the content on a different display or even as printed output, that color intent can be lost quickly in translation.

The Color Workflow

The color workflow from design to finalization to reproduction to end use presents many opportunities for product color to take a left turn, resulting in color miscommunication.



For example, a display or printer may render colors inaccurately out of the box, due to the gray balance of primary colors, or due to the tone curve or gamma settings that affect contrast. There can also be unexpected white point or black point miscalibration on displays due to inaccurate color temperature or on printer output due to variations in paper selection.

Pantone® has long recognized these challenges and developed Pantone Validated™ to objectively assess and quantify a color device's capacity to faithfully render Pantone Colors. When using a Pantone Validated device, an artist can create and communicate color with greater confidence, knowing their designed colors are represented in a proven color environment straight through to the final product.

Here's how it works...

Pantone Validated

Pantone developed an objective evaluation protocol to test displays and printers to determine how well the devices can reproduce Pantone Colors. Every Pantone Validated device model has met Pantone's evaluation and grading criteria by simulating the full range of Pantone Colors.



Our recognizable white on blue checkmark means that artists and designers can be color confident when using Pantone Validated products right out of the box. In addition, anyone using Pantone Validated products along the workflow should also have a better experience creating, communicating, and evaluating color when using Pantone Colors.

Understanding Color Gamut

Even with the latest display and print technology, the color output from some devices is more limited in color rendering than others. This means that if a designer is using a device that has the capability to display a wider range of colors than say their client, there's a chance the colors selected for a design may not be achievable as output from another display or print device.

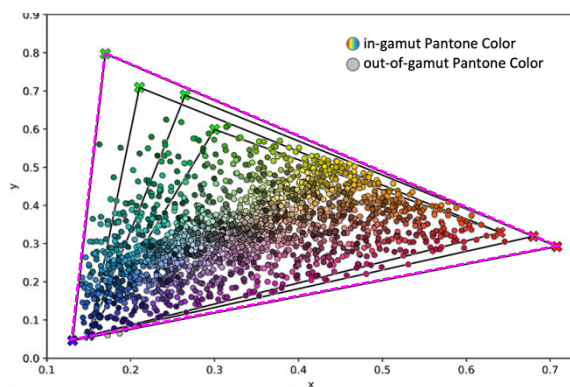
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The range of colors a device can reproduce is known as the *color gamut* and this range can be different not only in “size”, but also in “shape”, so understanding the underpinnings of a device gamut is important.

Display vs Display

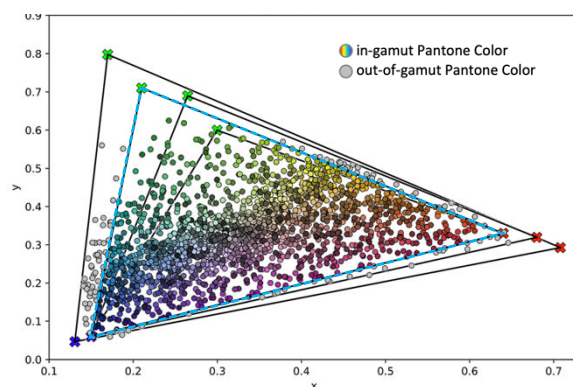
In the display world there are essentially a few standards that define the size and shape of a color gamut. The main color spaces are a) Rec 2020, b) DCI P3, c) Adobe RGB, and d) sRGB. The images below show these color spaces and also plot each of the Pantone Matching System Colors (from the Pantone Formula Guide Solid Coated [link](#)) that we typically use to qualify devices to become Pantone Validated.

Rec 2020 Display Gamut ---



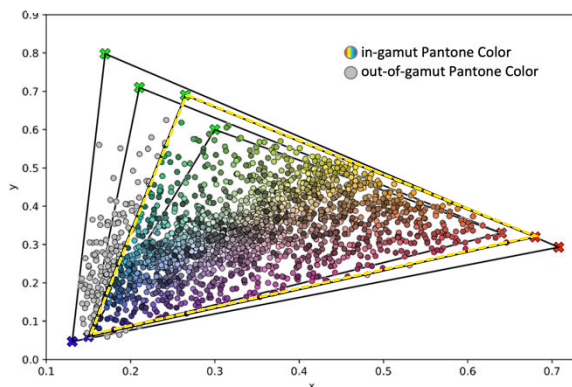
The Rec 2020 display gamut can represent all except a handful of saturated blue Pantone Colors. This is one of the newest display color gamut specifications and is not yet implemented in any mainstream products.

DCI P3 Display Gamut ---



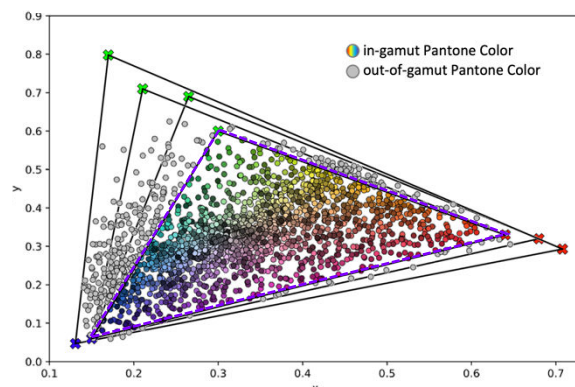
The DCI P3 display gamut can represent most of the Pantone Colors, but some of the most chromatic blue/green Pantone color shades will wind up looking just like their neighboring Pantone Colors along the blue-green gamut border.

Adobe RGB Display Gamut ---



The Adobe RGB display gamut is relatively large, but is lacking a few more of the blue/green Pantone color shades compared to the P3 display gamut.

sRGB Display Gamut ---



The sRGB Display is lacking a few more of the blue/green Pantone color shades, and also some saturated yellow/orange Pantone Colors.

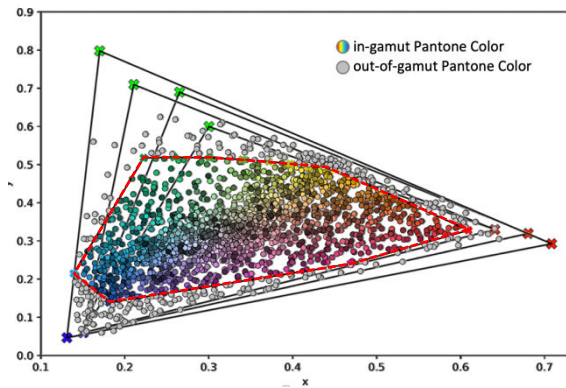


Print vs Display

In the print world, there are two typical benchmarks that define the extremes in terms of size and shape of a color gamut. Although there are many other types of print gamuts, we will cover only these two: a) High-Quality Inkjet 7c and b) CRPC6 4c (from ISO15339, GRACOL G7).

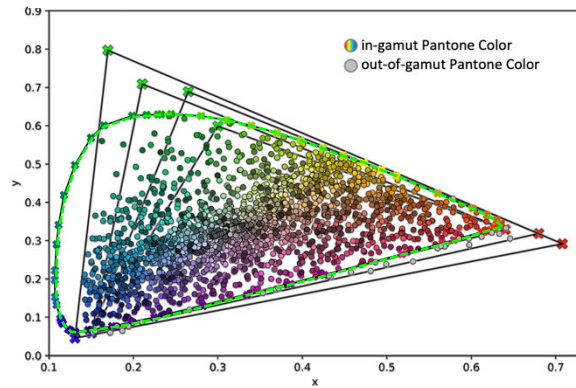
The images below show these color spaces and also plot each of the Pantone Matching System Colors that we typically use to qualify devices to become Pantone Validated. The four display gamuts are also shown on each image for comparison.

ISO15339/G7 CRPC6 4c Print Gamut ---



The CRPC6 4c print gamut is a similar size as the sRGB Display gamut, but it is a different shape, capturing a few more blue Pantone Colors but fewer green/yellow hues.

High-quality Inkjet 7c Print Gamut ---



The High-quality inkjet 7c print gamut is slightly smaller than a Rec 2020 Display gamut. It is a different shape, with a few less red/purple/blue Pantone Color hues.

Color Gamut and Pantone Validated

The number of Pantone Colors within the gamut of a display or printout is one determining factor in rating a device when evaluated against the Pantone Validated criteria, but not the only determining factor.

Even devices where some Pantone Colors are out of gamut can be successfully qualified as Pantone Validated, because Pantone Validated testing considers the quality of simulated Pantone Colors alongside the device gamut.

So, if a large percentage of the Pantone Colors are within gamut *and* the Pantone Color difference evaluations meet Pantone's color quality threshold, a print or display device can still earn the status of Pantone Validated.

Color Space	Pantone Colors in gamut*
Rec 2020	99%
HQ Inkjet 7c	99%
D65 P3	95%
Adobe RGB	94%
CRPC6 4c	86%
sRGB	84%

** Theoretical ideal percent of in-gamut Pantone Colors for each display or print color space.*

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Color Difference Evaluations and Pantone Validated

In addition to considering the percentage of Pantone Colors that are within a device's output gamut, Pantone Validated evaluations also consider the capability of the output to faithfully simulate each Pantone Color within a selected Pantone Color publication. Pantone makes use of industry standard color difference calculations to compare Pantone Master Color References to measurements of a device's color output.

These measurements are made using industry standard color instrumentation from X-Rite. Pantone's method, approach, and tolerance for acceptable color difference varies between output from printers and displays. However, in addition to color gamut, the overall evaluation of color difference weighs heavily in the overall device qualification criteria.

Pantone Validated Color Workflow

If a team's color workflow makes use of output from Pantone Validated devices, everyone can work with higher confidence knowing that a) Pantone has evaluated the output from these devices and found it to meet Pantone's criteria for acceptable color difference compared to the Pantone Master Color References, and b) the output device gamut has the capability to achieve a qualified percentage of the Pantone Color references.



This proven color environment doesn't require any special software, training, or technology – only that the products used display the Pantone Validated checkmark logo.

With the added understanding of typical device output color gamuts – and considering which hues of Pantone Colors may not be best represented with certain print and display output technologies – designers, artists, and other content creators using Pantone Validated products can work smarter and with a better appreciation that their color intent will be realized by their colleagues, partners, peers, and customers. To find a complete listing of Pantone Validated devices, go to pantone.com ([link](#)).

Pantone and X-Rite offer additional solutions to maintain, evaluate and control color in display and print. These products can be helpful to adjust color results based on specific local conditions, to keep color output consistent over time, and to “tag” designs and artwork with an artist's display color space so other display or print devices can best interpret and simulate the intended colors of their designs.

For more information, check out this free X-Rite eLearning course ([link](#)) on display profiling, or consider X-Rite's 15-module eLearning course ([link](#)) on a full color-managed workflow.

Please contact us to learn more about Pantone ([link](#)) and X-Rite ([link](#)) color management solutions ([contact us](#)).