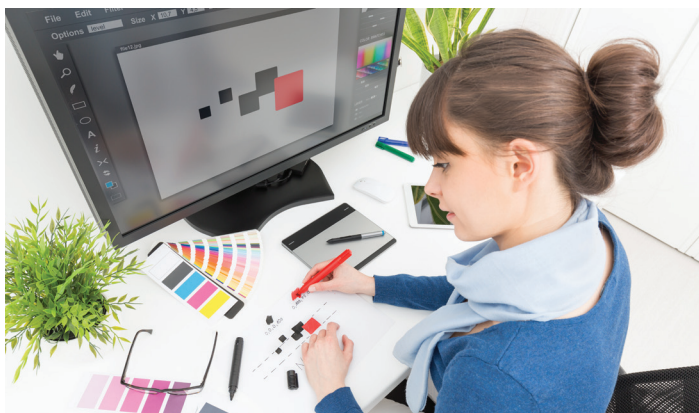


When Perfect Color is Job Critical

How to assess your current desktop monitor or a potential purchase



Professionals in a wide range of industries – including photo and video production, animation, advertising, and catalog and other print production – need absolute assurance that what they see on their monitor screens will be the exact same color that appears in print, on a TV or cinema screen, on a billboard or in any other medium.

But getting colors right isn't easy. One obstacle is that human color perception is highly subjective and inconsistent. Remember “[the Dress](#)” that went viral in 2015? The debate about whether the garment was blue-and-black or white-and-gold revealed that no one should trust their eyes. Likewise, is a tennis ball yellow or green? [Even Roger Federer may be mistaken.](#)

Another complexity is that the color capabilities of monitors vary greatly. Only high-quality monitors specifically designed for color critical performance can meet the challenge, and having a professional-grade display is not the end of the story. Monitors used for color critical work must also be calibrated to ensure color accuracy. To make things a little more complicated, there are two types of calibration that take different approaches, and the important distinctions between the two approaches are often overlooked.

Key Factors to Consider

If you're researching which monitor to buy or just want to make sure that your current monitor is up to the task, consider these five key factors when assessing whether a monitor meets your color critical needs:

1. Color gamut

Color gamut is the entire range of colors that a specific device, such as a printer or a screen, is capable of producing. A monitor with a wider color gamut provides a broader range of colors than one with only a standard color gamut. That means its greens are greener, its reds are redder – and so forth – which makes it easier to match colors with precision.

For print, the standard color gamut is sRGB, and Adobe RGB and ProPhoto are wider gamuts that provide a broader range of colors. For video, Rec. 709 is the standard color gamut, and [Rec. 2020](#) is the wider gamut. DCI-P3 is a gamut designed for cinema that falls between Rec. 709 and Rec. 2020, but most DCI-P3 users will be switching to Rec. 2020 in time.

For color critical work, look for a monitor that is rated to support as much of Adobe RGB, ProPhoto and Rec. 2020 as possible.

2. Color depth

Also known as bit depth, color depth describes the quantity of colors a monitor can produce. Most monitors process colors in 8-bit, meaning that they're capable of reproducing 16.7 million colors while more advanced monitors process colors in 10-bit. These advanced 10 bit monitors are capable of displaying 1.07 billion colors and have become the standard for color critical uses.

3. Brightness

Brightness refers to how bright the colors displayed on a monitor's screen are. A higher maximum brightness means that you can edit at higher level of brightness. For example, editing is much easier at 350 cd/m² (candelas per square meter) than at 250 cd/m². A monitor with a higher maximum brightness offers an additional bonus: It will have a longer useful life when calibrated regularly.

4. White Point

White point, or color temperature, refers to the color of white that a monitor is set at. White point matters because all devices that it will be viewed on should be set to the same white point. For photo editing and other color critical uses, 6500°K has become the white point standard, so choose a monitor that offers a 6500°K white point.

5. Black Level

For color critical work, a monitor's black level should be low in order to display deep black details. These details help viewers distinguish pure black from nearly black and avoid unwanted grays that may muddy the output.

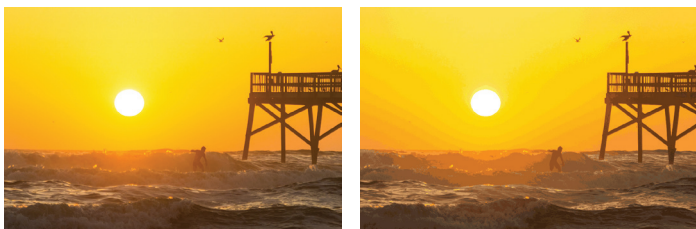
Look for a monitor with low black level capabilities.

Monitor Calibration

Color calibration is a necessity for any monitor used for color critical work. Calibration measures and adjusts a monitor's color response to ensure color accuracy. After a calibration, the color on the screen will match the intended color data in the digital file. The benefits of color calibration include easing and speeding up image editing, improving productivity, enabling on-screen "soft-proofing," saving time in post-processing and reducing the number of proofs.

Color calibration comes in two forms: software calibration and hardware calibration.

In software calibration, a sensor known as a colorimeter measures the colors that a monitor displays. Calibration software uses these measurements to change the settings in either the computer's video graphics card or operating system. Because video graphics cards and operating systems use 8-bit look up tables (LUTs) to adjust colors, software calibration reduces the quantity of colors sent to the monitor after calibration. That means for some colors the software instructs the computer to send a different level of color to the monitor, which can create undesirable artifacts called color banding.



In contrast, in hardware calibration the sensor measures the colors and stores changes directly in the monitor's electronics. The primary advantage of hardware calibration is that uses 10-bit (or higher) LUTs, which preserves the color space and avoids color banding. It also offers portability: You can plug any computer into a hardware-calibrated monitor and be assured of color accuracy.

Solutions You Can Trust

No one with color-managed workflows can afford to make mistakes when it comes to color. To avoid unwanted differences in color tones between your computer output and either printed or digitally displayed matter, you must be able to check your work on your monitor in real time.

Armed with the tips above on assessing color critical monitors and calibration methods, you should be able to find the right monitor for your workflow or to confirm that your current monitor fits your needs.

NEC offers a wide range of hardware and software solutions designed for professional photographers, videographers, prepress managers, or anyone else who demands high color accuracy.

Our [MultiSync PA Series monitors](#) are an ideal fit for color critical workflows. They offer many benefits, including:

- Superior color accuracy, with coverage up to 99.6% of Adobe RGB
- Advanced 10-bit color depth (with 14-bit LUTs)
- Bright panels, up to 350 cd/m²
- 6500°K white point
- Low black point

SpectraView™ II
Display Color Calibration System



MultiSync PA Series monitors also provide a consistent image edge to edge, and they are the only monitors on the market that keep white point and brightness steady for life of display. The white point and LEDs of all monitors will dim over time, but an always-on backlight sensor in every PA Series monitor makes adjustment as the monitor ages. Also, when the room's temperature changes – which can affect brightness – the monitor adjusts automatically. Even better, the adjustments won't interrupt your workflow.

NEC's user-friendly [SpectraView](#) provides hardware calibration for NEC monitors. It offers fast calibration (around 5 minutes with a USB-3 connection), and it's completely customizable for color gamut, white point, gamma corrections and other settings. Even better, you can save your customized settings and easily shift between color spaces – for example, between Adobe RGB and Rec. 2020 – without having to recalibrate.

NEC professional-grade solutions give you the confidence that you're delivering the best color work possible. To learn more about how monitor technologies can ensure color fidelity, visit us today at: www.necdisplay.com/solutions/color-critical/39.

About NEC Display Solutions of America, Inc.

NEC Display Solutions of America, Inc., a leading designer and provider of innovative displays, offers the widest range of products on the market, such as commercial- and professional-grade large-screen LCD displays, desktop LCD monitors, direct view LED displays, a diverse line of multimedia and digital cinema projectors, and integrated display solutions. Benefitting from the technologies of NEC Corporation and its own Research and Development, NEC produces leading-edge visual technology and customer-focused solutions for a wide variety of markets, including education, retail, transportation, broadcast, enterprise, healthcare, houses of worship, and many more. NEC is orchestrating a brighter world with the quality and reliability of its products and outstanding customer service. For additional information about NEC Display Solutions of America products, call (866) NEC-MORE, or visit the website at www.necdisplay.com. Follow us on our social media channels: Facebook, YouTube, Google+, Twitter and LinkedIn.