THE SECOND C: A Higher Class of Problem

By Keith Hoover

The November 2023 AATCC Concept 2 Consumer (C2C) Interest Group meeting featured an online discussion of "color communication throughout the supply chain," including participants from Natific, Under Armour, Swisstex Direct LLC, and VF Corp. Approximately 75 people joined the call to hear about how apparel brands and their supply chains manage color. While much of the discussion centered around the lab dipping process, panelist Brendon Roddy, Manager of Color and Print Operations at Under Armour, provided an overview of Under Armour's (UA) experience with the Color Accreditation Program (CAP) that has been laid out here in the Primum Mobile series of articles. (See Articles from "The Second C" series list on p. 28.)

PROVING THE CAP

In 2024, Under Armour marks its twelfth year in Natific's CAP. In that time, the color development process changed from conventional lab dipping to one of data acquisition and analytics. Color match requests are now digitally transmitted to CAP mills that, in turn, confirm the matchability of each standard (without sending lab dips) and subsequently upload spectral data for each production lot to the ColorWarehouse. The immediate result of this change was a faster color process and improved production color quality.

But wait, there's more.

In 2022, Under Armour issued their "Sustainability Impact Report"[1] outlining how the company was addressing these concerns. Figure 1 highlights UA taking credit for the kill with CAP. They pointed out that CAP impacted more than just an internal process, having "a positive impact reaching beyond UA products."

COLOR ACCREDITATION PROCESS

We were early to adopt the use of a color accreditation process for textiles to take color straight to production, cutting out the traditional water and dye-consuming process of multiple lab dips and textile samples to develop and approve fabric colors. Our Color Accreditation Program (CAP) advances the digital review and approval of colors, how fabrics and yarns are dyed, and the ways anti-microbial and water-resistance properties are applied to textiles.

In 2013, we partnered with consulting firm Natific to pilot CAP with some of our suppliers. This innovative process results in higher-quality color and eliminates weeks of development time, while reducing both materials use and shipping-related greenhouse gas (GHG) emissions. We have now applied the CAP to all UA color palettes and most solid color developments. This color-approval process is being adopted by other brands, resulting in a positive impact reaching beyond UA products.

Figure 1: Making a difference—an excerpt from Under Armour's 2021 Sustainability & Impact Report.

LIFE AFTER LAB DIPPING

Okay, let's say the quiet part out loud. "But, if we get rid of lab dipping, won't I lose my job?" It depends. If your only skill is looking at a little scrap of fabric and then typing, "Rejected—too bubble-gummy. Make it 20% more romantic and stay in the red quadrant," then yes, you will be fired and never work in the industry again. Ever.

But if you understand how managing color data can provide insight into overall product quality and process efficiency, then there is a future for you in data analytics (and not just at your present company). As you look around and see new rounds of lay-off's in the apparel sector, it should be clear that brands will retain associates who add strategic value over those who exercise mindless tasks. Color is important. Lab dips (and their handlers) are not.

So, what's a lab dipper to do in this brave new world? UA's Brendan Roddy laid it out in the C2C presentation. "We have pivoted to address a higher class of problem." Similarly, Marielle Newman, director of Color and Print at UA, stated in a recent interview, "We used to be a team of three who spent all day either in the lightbox or sending emails. Now we can be more impactful across business, working on a 'higher class of problem.'"[2] Clearly the company that makes all athletes better does so by solving higher classes of problems.[3]

I HAVE A PROBLEM—WHAT ARE YOU GOING TO DO ABOUT IT?

What are some of those "new and improved" problems? Well, all processes require clear specifications. Choosing the right color specification is the first and most important challenge for a designer. There is very little value in having the perfect match to an ugly color. Digitizing that color is the next step so that the specification can be communicated throughout the process. And identifying everyone that needs access to the color specification will bring real value. So, let's identify the phases and conventional processes—outside of lab dipping—that a color team coming out of a lab dip recovery program can tackle.

Challenge #1—Color Exploration

What is the best way to explore color that is not limited to "found objects" (like old garment swatches) or pre-defined sets of commercial colors (that anyone can use)?

Color exploration is a critical part of the design process—it enables the designer to attach a physical specification to what is in the "mind's eye."

Although color exploration is arguably the most critical phase of product design, there has been little recent innovation to support it. Datacolor Envision has its roots in the 1990s product "ImageMaster" that displayed "accurate" color on old cathode ray tubes. Archroma and CSI launched certified color standards backed by spectral data between 2001 and 2003. Pantone converted from TC's to TCX's in 2010. Natific launched the CAP in 2007 and the VooDoo feasibility service in 2016. Not much of anything has happened in color technological innovation in the last decade. Consequently, brands still rely on the same resources and process that they have for nearly 75 years.

Physical Color Libraries

Several companies provide collections of pre-selected color swatches aimed at design-related companies. These color libraries are in widespread use. They are set up like boxes of crayons, albeit very big boxes of crayons. They range in size from roughly 2,000 to 5,000 colors. Approximately 1,900,000 distinguishable colors[4] can be created on textiles, so these libraries are limited to representing a very small subset of all color choices. What colors have been left out of these libraries? It is a running joke among color providers that, if a color library has 5,000 colors, a designer will tell you that it needs 5,001.

In addition to their limited selections, color libraries are constrained by organization. All are organized by major groupings like red, green, yellow, and blue, but beyond that, several approaches are in use. However, all physical library displays are organized on two-dimensional flat surfaces, whether on book pages or on wall displays. Yet, color has three dimensions—hue, lightness, and chromaticity. So, systems that transpose these three attributes into an X-Y axis further undercut unfettered access to colors in the library.

This textile series will share technical insights and wisdom of AATCC members. The "Second C" series will focus on color. If you wish to contribute your own technical insights on topics of interest to AATCC members, contact Communications Director, Maria Thiry; thirym@aatcc.org.

The perceived color of any physical swatch is dependent on the light source under which it is viewed. However, few design studios are equipped with proper lighting. And "portable" color library books compound this problem since they are likely to be viewed under multiple lights in many locations. Few color standards are engineered to account for color inconstancy, so colors selected from physical color libraries may end up being "wrong" when viewed under different lighting conditions.

And finally, it is said that color perception is a psycho-physical phenomenon (heavy on the "psycho"), thus making color selection a psychological process. First, color plays a big role in making a new design attractive to the merchant (so that it gets added to the line) and customer (so that it is purchased). Each color must be "just right"—and different than colors that other people are using. So, relying on these commercial collections of colors that were chosen by someone else (ostensibly someone with far less aesthetic vision than the designer in search of color) is an anathema to a truly talented designer. Equality might be a good concept, but design is a selective profession driven by the presence of talent—not everyone grows up to be a designer.

Onscreen Digital Color Libraries

Some physical color library providers license their product to be viewed onscreen in various software programs (or at least they used to). This provides a convenient way for graphic artists to set up color palettes for design. However, as a means for exploring color—finding that perfect shade—onscreen color presents the same shortcomings and limitations as its physical counterparts.

Onscreen color lays down several additional obstacles for color exploration. First, unlike looking at a swatch (that shows color by absorbing light), onscreen color is literally looking at the color of light emitted from a computer monitor. A computer monitor emits light much like a light bulb. Fabric swatches do not. So, regardless of color accuracy, there is an appearance difference between color on a monitor and on a physical swatch. This is referred to as "media-difference."

There are many specific settings that control onscreen color. For instance, there are several models for RGB (the digital building blocks for onscreen color). Each model is capable of displaying a different gamut, or range of colors, based on the intended output. The gamut of colors that can be displayed via typical computers connected to the internet is much smaller than what is achievable on a high-grade monitor. The RGB values for a given color in the sRGB model are different than the values for the same color in the Adobe 1998 model. Other color models like L*a*b* describe a color under a specific light. The L*a*b* values of color defined in D65 are not the same as the values in Illuminant A.

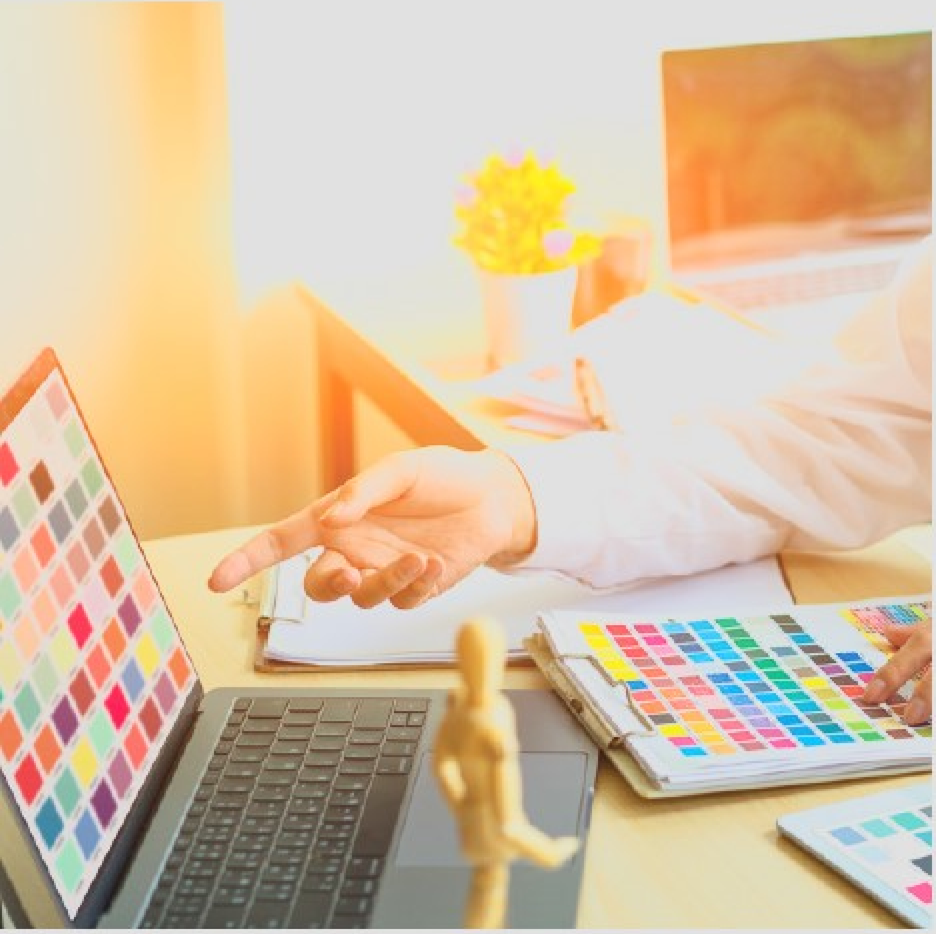
And then, there's monitor calibration. We have all seen how color appears different from TV to TV in a big box store. Unless periodic maintenance is done to calibrate the screen, colors will be inaccurate. So, unless all of the technical set-up requirements are met, onscreen color is imprecise.

And finally, there is appearance. We have already pointed out that the appearance of color emitted from a light differs from the color of a piece of fabric. Texture is another kind of appearance, as are sheen and gloss. The surface properties of materials affect our perception of a base color. The effect of textural appearance can be readily seen on physical swatches. However, it is not so simple to display on a computer screen. Simultaneously modeling color and appearance in a computer program is complex—the type of work done in expensive CGI programs.

Challenge #2—Color Specification

What is the best way to specify color across the organization—product development, packaging, marketing, and eCommerce?

Color specification follows color exploration and occurs during product development. It follows many paths. Most downstream product color problems can be traced back to improperly defining or documenting the colors selected by the designer during color exploration.



Product Color Development Confusion

Most product development processes lack the means to define a clear color specification at the start of the design process. Although a designer might have found the "perfect color," it is up to the CAD and DPC teams to translate that inspiration into the software used to create designs. Interpretations of the original swatch color are created through various attempts to match the color onscreen or with a paper printer. Color data imported from licensed digital color palettes might not be compatible with the CAD software settings, thus not matching the originally selected color. In either case, CAD users must try to set or "fix" the match in the software. This is likely to happen several times by different users, so the original "perfect color" devolves into several competing versions. By the end of the development process, it is unclear just what the standard is.

eComm Color

Online retailing is a large part of an omnichannel strategy. Unlike styling products on mannequins in the store, setting up products on a web page is a product creation process unto itself executed by either a separate part of the company or an outside agency. Traditionally, this involved procuring product samples early, photographing them (either on or off models), and editing/compositing the images for various platforms and media. You would think that, since so much time and effort went into product development by the design team, there would be a seamless data flow to the Marketing/eComm creative team (MECT). For the most part, you would be wrong.

MECT spends considerable resources color correcting images. Whether or not the product samples are color correct (many are not, since they are not actual production samples), they must be edited for color accuracy due to the nature of the medium. Additionally, product color can be radically altered (from grey to red or any other color) to present the desired look, But, in all these scenarios, there must be a reference digital color standard.

Some teams compile physical swatches and attempt to match them (similar to CAD color development). They face the same issues described in the "onscreen digital color libraries" section. Other teams farm this work out to freelancers or digital service agencies at a hefty price.

"Hey, wait a minute, We can use our 3D assets created by the DPC team instead of pictures of models wearing our products." Well… product development and MECT have different output requirements.

When a DPC associate creates a 3D image, it is important to be accurate and show what the product will really look like when worn. Ideally, that image should provide the same level of product detail as a sample garment on a fit model. Drape, fit, folds, and overall appearance are important.

However, when styling a model for a photoshoot, garments are often pinned and adjusted to hide folds and mask the overall appearance of the fit. That and runway/product models typically have much different body shapes and sizes.

Consider also that color is defined and managed using a device-dependent sRGB model in 3D design software. All of the technical issues described above come into play when the MECT associate edits an image.

In addition to technical color management issues, there might also be organizational/political/turf issues when reaching across the organization. Efforts to leverage digital color assets and processes from the product development color team might be met with similar fear of job loss on the MECT team.

SOLVING VS. ADMIRING THE PROBLEM

Or not. The point here is not to despair or shrink back. Rather, you need to prepare as a technical leader and a management leader. In the next article in the series, we will identify and present new color technology that will enable color teams to address those higher classes of problems.

Keith Hoover, President of Black Swan Textiles, implements manufacturing-centric digital processes for color and fabric development. He has implemented digital color management programs for Ralph Lauren, Target, Lands' End, JCPenney, and Under Armour, ultimately leading to a process that eliminated lab dips altogether. At Under Armour, Hoover championed the UA Lighthouse, driving digitalization and advanced manufacturing processes to explore local-for-local sourcing. He has worked hands-on in mills worldwide and is a frequent AATCC presenter.

Notes

1. **https://about.underarmour.com/en/Purpose/Sustainability/2021SustainabilityImpactReport.html**
2. **https://natific.com/celebrating-10-years-of-asap-part-2/**
3. To be fair, it was Russ Merritt, co-author of "The Second C: The Ninth Sphere of Paradise—Primum Mobile, Part 1" who first used this phrase in the context of digital color management back in 2007.
4. 360 hue angle degrees x 90 Lightness steps (<10 cannot be achieved) x 60 Chromaticity steps (>60 can only be achieved in yellows) = 1,944,000. This figure does not include yellows with a chromaticity > 60 or fluorescent colors with a chromaticity value > 100.

Articles from The Second C: Series

- Hoover, K. The Second C: Color with a Purpose. *AATCC Review*. **2022**, *22* (1), 36-39.
- Hoover, K. The Second C: From Inspiration to Replication. *AATCC Review*, **2022**, *22* (2), 28-32.
- Hoover, K. The Second C: Lab Dips—The First Circle of Hell (Part 1). *AATCC Review*, **2022**, *22* (3), 26-30.
- Hoover, K. The Second C: Lab Dips—The First Circle of Hell (Part 2). *AATCC Review*, **2022**, *22* (4), 32-36.
- Hoover, K. The Second C: Leaving Limbo. *AATCC Review*, **2022**, *22* (5), 34-39.
- Hoover, K. The Second C: The Sixth Circle of Hell—Heresy, Part 1. *AATCC Review*, **2022**, *22* (6), 34-39.
- Hoover, K. The Second C: The Sixth Circle of Hell—Heresy, Part 2. *AATCC Review*, **2023**, *23* (1), 26-33.
- Hoover, K.; Merritt, R. The Second C: The Ninth Sphere of Paradise—Primum Mobile, Part 1. *AATCC Review*, **2023**, *23* (2), 22-28.
- Hoover, K. The Second C: The Ninth Sphere of Paradise—Primum Mobile, Part 2. *AATCC Review*, **2023**, *23* (3), 22-28.
- Hoover, K. The Second C: The Ninth Sphere of Paradise—Primum Mobile, Part 3. *AATCC Review*, **2023**, *23* (4), 26-31.
- Hoover, K. The Second C: The Ninth Sphere of Paradise—Primum Mobile, Part 4. *AATCC Review*, **2023**, *23* (5), 34-39.
- Hoover, K. The Second C: The Cost of Color. *AATCC Review*, **2023**, *23* (6), 34-43.
- Hoover, K. The Second C: The Truth About Color Revisited. *AATCC Review*, **2024**, *24* (1), 26-33.