



Ensuring

Color

Integrity

New color measurement and information-management systems can reduce production costs and speed time to market.

by Kenny Thomas

To get your product to market faster with lower cost of goods and consistent quality, you need a plan. An often overlooked strategy—one that’s realistic and workable—involves color integrity in your product.

Color integrity means color you can trust, from design to final approval. Creating color integrity ensures a cascading effect of positive results that are both extensive and measurable. Customer

Know & Go

- Color integrity—or color you can trust, from design to final approval—can make the difference between product-line failure or success.
- A solid color-integrity infrastructure pays real dividends; it enhances service, simplifies oversight and streamlines communication.
- Effective virtual prototyping ensures accurate, manufacturer-friendly color, streamlined product development and solid color communication.
- True color-integrity should accommodate physical realities, as a human being is eventually going to view a real product in a real environment.
- Don’t settle for mere automation. Look for color technologies that minimize product costs, enhance product quality and speed time to market.

perception of your product’s quality immediately improves and sales increase. Success breeds further success as each step in color communication and production becomes more efficient. Your approach to color integrity can make the difference between product-line failure or success.

To take advantage of new color management systems, and create useful color specifications, efficient decision flows, faster product prototypes and reliable product quality, read on.

Assess yourself

Despite its simple definition, creating color integrity

is frequently far from simple. Changing attitudes, breaking down barriers and transforming longstanding practices can be challenging. The first step is an honest self-appraisal.

To begin, consider how well these statements apply to your company or supply chain:

- Getting the color we want from a supplier involves repeated questions and conversations, or multiple submissions.
- Lighting and viewing conditions for color samples are up to individual evaluators.
- Color evaluations are often late or require last-minute reminders.
- Making a color approval can mean sifting through multiple “standard” samples.
- Tracing working standards to a master standard would be difficult or impossible.
- Learning results of a color evaluation often means first finding the evaluator.
- Knowing what’s expected, and when, involves searching multiple systems, such as spreadsheets, documents, e-mails or meeting notes.

If those statements describe processes in your company, you’ve identified an opportunity, and you’re ready for positive change. Some of the next steps will enable you to:

- Envision the color of your new product in typical environments.
- Create unambiguous color specifications—including standard lighting and viewing conditions—to eliminate questions and time-wasting iterations.

- Share evaluation deadlines and intelligent color tolerances for on-time decisions.
- Create and share master and working standards for consistent product production and evaluation.
- Integrate multiple information sources to create effective decision flows, and ensure that everyone knows the latest decisions, what's expected of them and when those expectations need to be met.

If you're thinking, "Those recommendations hardly constitute groundbreaking news," you're correct. The fundamentals of color information management haven't changed; rather, the scope and complexity of the environment in which they're embedded have evolved.

News you can use

The trend toward globalization continues, and the pace of business increases. These two factors can quickly overwhelm traditional infrastructure and processes that rely on everyone working at a single location or on the same schedule.

In this new world order, the real news is this: Fusing color measurement, digital design and information technologies creates a new infrastructure of color integrity that can augment and replace outdated processes. Unlike its traditional physical counterpart, an electronic infrastructure works across multiple geographies and time zones, even for the most complicated network of suppliers and customers.

No matter where you start building this new infrastructure, investing in a color-integrity infrastructure pays dividends. From design studio or laboratory to manufacturing or the retail channel, reliable color information enhances service, simplifies oversight and streamlines communication.

Design

The most spectacular effects from color integrity originate with a product's visual design. Today, visual design begins with virtual product prototyping.

Virtual product prototyping creates accurate, manufacturer-friendly color, speeds product development and creates a solid foundation for color communication—in other words, it adds color integrity to product prototyping. The key to building an effective virtual prototyping

process doesn't rely on the technology of any single product, but rather in the way multiple color-management products work together.

Creating a "closed loop" system of color creation, approval, management and control through a combination of the latest color-technology hardware, software and instrumentation reduces error, reduces communication time and decreases the number of iterations to settle on the "right" color.

The benefits come from an unequivocal, reality based, device-independent, lighting-independent and observer-independent color-specification system that all color-technology tools understand—running on a digital backbone that makes communication fast and reliable.

For an overview of how virtual prototyping works in actual production, it pays to take a look at where color begins—at the conceptual stage.

Designers are among the top trendsetters across industries, creatively striving to meet market demand for distinctive colors and motifs. However, many find their ability to experiment restricted by product schedules or budgets that allow only a few product prototypes. Worse, designers often face the late realization that a critical color can't be prepared in the intended product material or process.

Now designers can build color integrity into the conceptual stage, when changes are fast and inexpensive. They can "see" as many color prototypes as they want using a digital color-sampling and visualization system. Digital color sampling eliminates the need for physical samples by effective measurement—replacing the physical sample with a series of numbers. In the context of product design, it creates numeric specifications for an object so that designers are no longer forced to pick a color based on general red-green-blue (RGB) values that come with a standard operating system, or trying to match the color on their monitor to that of a ripe, red apple.

Moreover, designers can infuse products with color in a virtual environment using elements such as material surface and texture that influence color outcomes before these variables create costly surprises in production.

Digital sampling during product design supports color integrity well into the production phase and beyond. Manufacturers can achieve accurate matches to targets faster and less expensively. By seeing how a process or formulation change will appear on the product in a virtual preproduction environment, formulators can predict the true visual effect of formulation changes or off-shade reproductions before committing time and raw materials.

Streamlining your color chain

Of course, digital visualization tools alone won't guarantee color integrity. A true "best practice"

strategy unites virtual tools and accurate color-measurement devices to maximize human creativity.

Such a system works by overlaying onto a scanned product image the spectral fingerprint of a real-world object taken from a spectrophotometer measurement or synthesized mixtures of colorants from a manufacturer's library. Software automatically corrects lighting and monitor variation before the images are presented on a high-resolution computer monitor. Using such a system, designers, manufacturers and even customers, regardless of their locations, can judge the same image and image color.

Imagine the efficiency of a single-source color approval. With everyone accessing the same information and seeing the same image, time and cost savings combine with faster time to market for new products. Organizations reap a double bottom-line bonus.

Suppliers also reap great benefits from a system designed for color integrity. They can electronically deliver approved color standards through a digital sampling submission program to produce virtual

Building an effective virtual prototyping process relies on the way multiple color-management products work together.

trials and working standards based on available colorants and product specifications. Suppliers return these virtual samples instantly for visual confirmation of instrumental evaluations. Such samples distributed through an integrated information and decision flow let everyone know what evaluations are expected of them and when.

Even when iterations are required, the latest digital tools for color creation, concept exchange and decision management work to reduce the number of iterations

and increase their speed—whether across town or oceans.

Instead of sending physical samples for visual evaluation, it is now possible to measure the samples in one place and electronically forward the numbers—the same numbers that can be used to display the object color for visual confirmation, or by a color quality control system to evaluate those numbers against predetermined tolerances to determine how likely it is to be accepted or rejected by a human evaluator.

Although everyone in a supply chain benefits from increased visibility and organization of information, the value of this strategy includes further advantages:

- Digital color standards never fade or wear with handling. (Of course, you must be vigilant about recalibrating the media that visibly render these standards.)
- Digital color data are input-ready for distribution to color-matching systems, printers, other suppliers or end-users for quality assurance, ISO standards tracking or derivative development.

True Color In, True Color Out

Burlington Industries Inc. has been a fashion trendsetter since it was founded in 1923. In 2004, the North Carolina-based textile manufacturer was combined with Cone Mills Corp. to form International Textile Group.

A willingness to adopt cutting-edge technologies is key to the Burlington WorldWide division's ability to deliver specialty, value-added products that stand out in a crowded marketplace. Color plays a critical role in achieving these objectives—both as a highly regarded buying influence and as an important factor in managing the bottom line. "In the end, we are in the business of color because people express fashion through color," says John Lanier, Burlington division technical manager.

The design, specification and control of color processes within the apparel industry is complicated and crosses many departments. In addition, pressure from an ever-changing fashion market requires that color is not only developed according to specification, but is also of consistent quality, delivered on time and ultimately "sellable."

To meet the exacting needs of its clients, all locations of Burlington WorldWide involved in color utilize Datacolor technology as part of an integrated, seamless color system. Some 2,500 employees are located throughout the division's production sites in Hurt, Virginia; Rockingham and Raeford, North Carolina; and Mexico.

The first step in Burlington's innovative color system is virtual

prototyping, a hardware/software solution that allows designers to use digital color sampling for the creation, manipulation and communication of "true" colors by applying them to real garments displayed on sophisticated calibrated monitors. This allows designers the freedom to explore and express color as emotion, aesthetics and identity, while it also yields the precise and tangible color direction Burlington's Hurt dyeing facility needs. The system practically eliminates physical color standards, long a source of misunderstanding among designers and manufacturers. Physical standards are often small, making them difficult to handle or measure, and, particularly for natural fibers, are often unstable in light, heat and humidity.

Instead, Burlington WorldWide now allows the color of their virtual prototypes to serve as color standards for the dyehouse.

Burlington further simplified and streamlined color production by linking its digital sampling capabilities to a cost-effective color-matching and recipe-formulation system designed for speed to market.

Traditionally in this time-consuming process, the laboratory attempts to locate an existing match in archives of approved production formulas. If a reasonable match is identified, a sample is sent to the customer in the hope of gaining an approval and eliminating the cost of developing a new dyeing or printing formula. If no such formula is avail-

able, a new dye formula must be developed.

Burlington has alleviated these potential problems, and more. The division uses comprehensive software that delivers results "as close to perfection as I've ever seen," says Ralph Logwood, new color development and lab dye formulation manager for Burlington. Logwood, along with colleagues Wesley Hall and Ronnie Smith, both dyehouse technical managers, credit the new integrated system of color matching and formulation with a remarkable ability to produce accurate, first-time recipe creation. Both Smith and Hall, who are responsible for shade adjustment and control at Burlington, have utilized the system's unique database to great advantage. They have been able to develop methods of error-free production recipe formulation and cost-effective process optimization.

"We are now able to manage excellent shade control and repeatability," Smith acknowledges. "The technology alerts us immediately when a shade starts to drift from standard, so we can proactively handle it without bothering the customer."

Of course, offshades still occur when, for various reasons, the established color fails to repeat in production. Hall acknowledges that the new system has helped in these instances as well.

"Our customers depend on our ability to produce a color on a fabric of their choice, be able to repeat it, and deliver it in a timely manner,"

- Digital color samples eliminate the time and cost of courier delivery.
- Complete digital specifications increase the speed of color matching.

Finally, digital sampling and color-decision management systems are capable of powerful predictive analysis. Past decisions of color evaluators are instantly available to those who need them. Tools in some systems use decision histories to develop tolerances and predict likely future decisions. This capability gives suppliers a

says Hall. "Now, even though an offshade has to be reworked, we still can meet our commitment. The system has reduced the turnaround time from days to hours to get a color back on shade and shipped to the customer."

The seamless incorporation of color quality control software is also critical to monitoring a manufactured color relative to the original target. With a comprehensive system of color quality control in place, workers at the finishing operations in the Hurt facility are evaluating color against the original standard as well as against previous production dyeings to ensure repeatability.

Clearly, the benefits of a comprehensive system for the entire color cycle have been felt companywide, from creating and matching customer requirements to managing and meeting color quality control objectives. The division is able to put all of its considerable expertise into an integrated system that holds to a true standard throughout the entire color cycle, yielding true color in, true color out.

Today's industry requirements—producing higher-performance fabrics while keeping in step with fashion trends—remain a challenge to textile manufacturers. The emergence of ITG's Burlington WorldWide division as a leading apparel fabric provider for major, global brands is a testament to its enduring customer commitment.

quantitative edge in response time. Subtler benefits include enhanced corporate image and strengthened customer relations.

Evaluation integrity


Besides using digital color, a strategy for true color integrity must also accommodate physical realities. No matter how efficient digital systems are, unless your company's goal is to sell virtual


products, a human being is eventually going to look at a real product in an environment over which you have limited control, if any.


Normal human vision is notoriously variable, as are evaluation conditions, such as lighting and surrounding environment. What can you do to ensure that your strategy encompasses real-world factors that affect color?

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First, do your homework. The more you know about your clients, your own color processes and color-integrity technology itself, the better your position in the market relative to competitors. Remember that business is still a game of information, and the old cliché, “knowledge is power” is as true as it ever was in formulating a valid color-integrity strategy.

Second, use technology for what it does best and concentrate on the fundamentals. Color-integrity tools provide a great new infrastructure, but the essentials of color control haven’t changed. For example, you should still:

- Formulate product color from spectral curves to reduce rejections and bad impressions stemming from variable lighting and evaluation conditions. In other words, control your product’s interaction with light by placing it with instruments capable of measuring the properties in your products that affect color outcome.
- In a group of colors that will be evaluated together, limit colorant combinations for the group’s formulation to preserve the color harmony envisioned by the designer.
- Analyze the variability of your color processes to support more effective pricing and process-enhancement decisions.
- Know your color process capabilities to prevent over-promising tolerances tighter than your process can hold.
- Precisely specify instrumental and human evaluation conditions to promote consistent assessments and compatible conclusions.
- Select a technology partner with experience in your industry to leverage support and knowledge in creating and implementing your color-integrity strategy.

One last caveat: Don’t ignore the physical side of the color-evaluation equation when striving for color integrity across the supply chain. In fact, the considerable benefits of digital infrastructure and virtual environments aside, the right color-measuring instrument is more crucial than ever, producing data that ensure consistent color as they move through the supply chain.

To ascertain the quality of a color-measuring instrument, first look for objec-

tive standards to use in judging a spectrophotometer. Consider the needs of your supply chain to determine specific functional requirements for your instrument of choice—from special applications to whether you need a reference-grade instrument.

It pays to work smart

What happens in a color lab can profoundly affect color integrity. As market demands shorten lead times and heighten the need for more customized color choices, a typical formulation lab is handling more than ever before. More complex formulas and testing requirements increase the potential for error. Manufacturers and their suppliers can waste valuable time and material trying to obtain the right color.

The latest technologies are designed to support higher throughput, more efficient color matching and color integrity from lab to production. This yields greater overall productivity for manufacturers than ever before.

How long would it take a person, even a master colorist, to test 500 pigment combinations, much less 500 million? Comprehensive software packages provide virtual laboratories and automation to take over detailed tasks, and free operators for more creative problem solving and higher-order analysis. Some add useful tools such as one-click target measurements and “no questions asked” matching. These easy-to-use functions increase productivity and reduce the use of expensive raw materials.

However powerful these functions, don’t just settle for automation. Look for color-matching systems that enhance your bottom line by moving beyond automating manual tasks. The best color-matching systems can minimize product costs, enhance product quality and speed time to market. Those with live data operation have the flexibility to change anything and view the color effect immediately. Adaptive correction technology improves with each successful operation and provides

extensive support for the widest range of materials, from transparent and translucent to opaque.

Finally, any color technology you consider should be designed to support the current global economy. This means systems, software and equipment with an enterprise-deployable architecture that allows multiple users immediate access to a centralized database and color control from anywhere in the world.

Clearly, everyone involved in color production needs color data that are reliable, error-free and compatible. Whether you’re formulating color, controlling a coloration process or exchanging color samples in a global web of suppliers and customers, color integrity is critical to your

success.

Color you can trust, and data that are reliable, error-free and compatible yield benefits that reach all the way to the bottom line. This includes selecting color technology that streamlines and supports every stage of business—from a cost-effective and vibrant color-production cycle to dynamic branding, merchandising and sales strategies.

About the author

Kenny Thomas is a product manager for Datacolor. His 24-year work history encompasses experience across a range of industrial color production and color technology. This includes process control, color production, process consulting, technology implementation, system specification and software development. Thomas’ responsibilities always have entailed working closely with customers, an aspect of his job that has taught him the importance of listening to and observing customers in identifying and resolving critical business issues.

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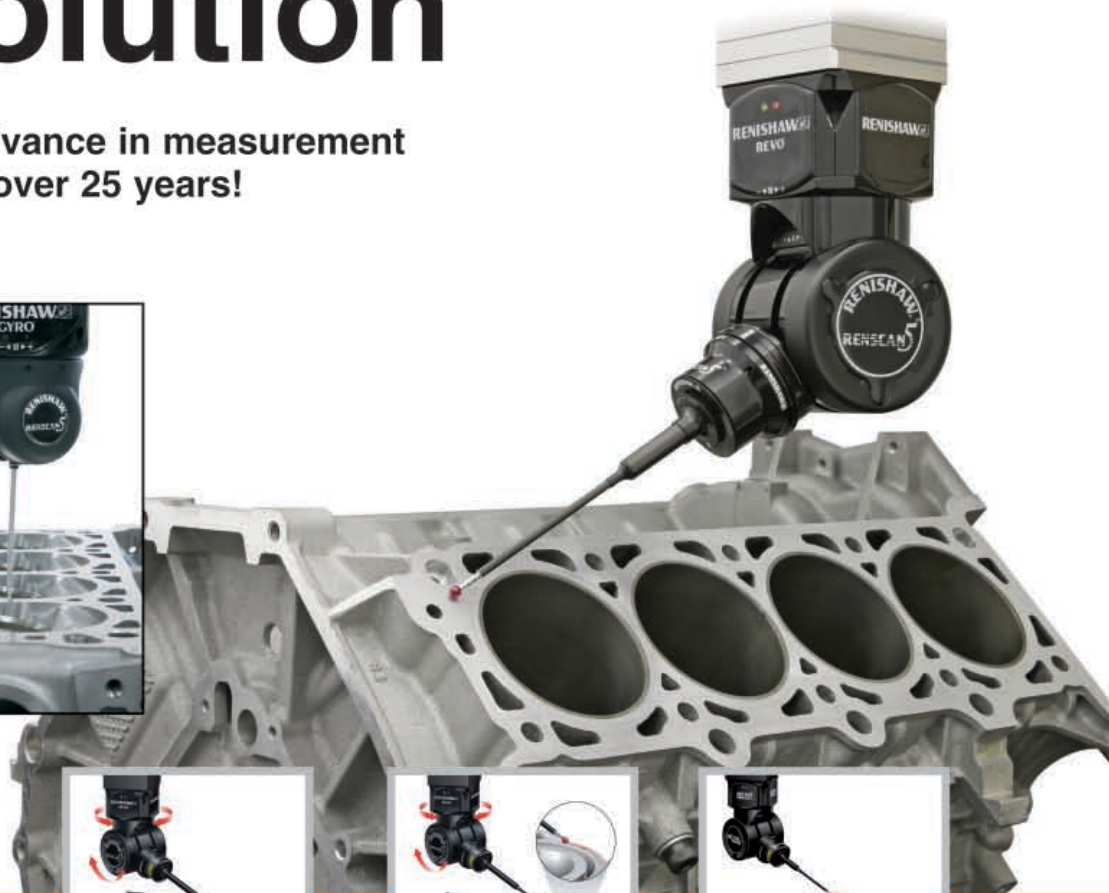
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