THE SECOND C: Intentional Color Loss

By Keith Hoover and Ken Kiser

Managing color for the majority of garments produced and sold in our industry focuses on the application of color to fabric. Once the right color is applied either through dyeing or printing, then the work is done. It is true that some chemical or mechanical finishes alter the final shade; however, those processes can be simulated and factored into the color applied to the fabric.

But what happens when the desired appearance of the finished product depends on *intentional color loss*—that is, removing color from a fabric that has already been assembled into a garment? This is typically a stage in washed denim programs, but it also can be required for conventional solid color programs.

I first encountered this process when I worked for Ben Bell at Polo (Ralph Lauren) R&D in Greensboro, NC, USA. Prior to Polo, Bell had spent a productive career in color management at Burlington Industries developing digital color technology and dyebath monitoring processes to assure consistent onshade production. So, when Bell was given a project to select dyes with "controlled *low* washfastness" for garment washed "vintage" khaki pants styles, he looked at me and said, "I've been working my whole career to avoid that."

Garment washing can be a step in conventional apparel production. It has typically been done to pre-shrink or improve the handfeel of a garment. As long as dyes with good colorfastness are used along with a select group of softeners, no shade change occurs in this step.

However, a process was needed to simulate how garments weathered over time. The garment wash process was a two-stage vehicle to accelerate the color loss associated with garment aging.

In this article we will review a color and appearance control process for woven bottoms to which a garment wash is applied for intentional color loss and appearance change. [1] This process is applicable to both denim and piece dyed woven or knit products. Note that the steps outlined take place at separate facilities, often times in different countries. Therefore, communication of specific SOP's and coordination of effort and expectations is crucial to success. It doesn't just happen by itself.

OVERVIEW

The final appearance of a washed garment depends on a combination of 1) the color appearance of properly prepared and dyed fabric and 2) appearance attributes such as high/lows and wash abrasion introduced during wet processing (aka garment washing). This SOP focuses on garments constructed using denim or piece-dyed fabric to which wash processes will be applied. It does not address garment dyed apparel.

Figure 1. Garment washes with intentional color loss can be applied to denim or solid color programs. Image generated by newarc.ai.

This procedure covers:

- Setting the **Pre-Wash Master Standard** for use in the dyehouse
- Ordering development yardage
- Creating wash allocation blankets
- Determining acceptable shipment shade levels to conform with the apparel brand's design and quality requirements

Successful development and execution of washed piece-dyed woven bottoms starts with the identification of "inspiration targets" (arbitrary samples that communicate aesthetic elements) and results in establishing manufacturing-related standards to be used to assure that production meets the aesthetics identified by the inspiration target.

This process establishes two standards. The first is a washed garment (made from a known fabric) that displays the desired color and appearance attributes specified by the apparel brand designer. The second is a sample of the mill's unwashed dyed fabric used to construct the garment standard. The unwashed dyed standard becomes the mill's master standard to which all production dyelots are compared. The washed garment standard becomes the laundry's master standard to which all washed garments are compared for acceptance.

The intent of these "Master Standards" is to ensure that the mills, cutters, and laundries have definite specifications with which to assess the acceptability of the material components and finished garments as they are produced.

Key Terms

Allocation Wash—The garment wash process set up at a fabric mill used to simulate laundry wash processes on finished goods, incorporating the mill's fabric used in garments that include wash programs.

Approved Garment Standard—A reproducible sample garment approved by the apparel brand designer that has gone through documented processes. Standards are available for each phase to assure repeatability.

Pre-Wash Master Standard—A sample of the unwashed dyed fabric from the trial run that produced the yardage used to make an approved wash panel, along with the spectrophotometric measurement and dye recipe used in the dyeing process.

Sample Wash Panel—A panel constructed from requested sample yardage that has undergone a standardized wash process.

Standardized Washes—Any number of repeatable wash processes that follow clearly defined procedures and recipes.

Wash Inspiration Target—Purchased garments, competitive wash samples, or previous apparel brand development samples used by apparel brand designers to communicate a desired garment aesthetic.

DEVELOPMENT PROCESS

Wash Inspiration Target

The apparel brand design team identifies a **Wash Inspiration Target** that represents the approximate desired finished garment.

A) Wash Inspiration Targets can consist of purchased garments, competitive wash samples, or previous apparel brand development samples.

a. The minimum size for a Wash Inspiration Target is 8 ×10 in., since it must adequately represent appearance attributes (such as seam abrasion, etc.)

b. A Wash Inspiration Target is not necessarily made from the same base fabric as the garment under development, but the supplier must attempt to duplicate the appearance, abrasion contrast, color/cast, and handfeel using the fabric direction included in the Sample Yardage Request form.

Figure 2. Before and after. Image courtesy of Nudie Jeans

Figure 3. The impact of different garment wash procedures on the same unwashed garments. Image generated by newarc.ai.

B) The apparel brand design team works with the color team to set standards for afterwash color appearance.

a. The color team compares the flat areas of color in the Wash Inspiration Target to all colors in the apparel brand color library and assigns a suitable apparel brand color standard ID, representing the afterwash color appearance. [2]

b. The apparel brand design team may select a color standard different than the afterwash appearance of the Wash Inspiration Target, if desired.

C) The apparel brand design team sends the Wash Inspiration Target along with a Sample Yardage Request Form to the designated production team (either internal or vendor owned, depending on the brand).

a. A Sample Yardage Request Form must include as many specific fabric, wash, and garment instructions as possible (including the apparel brand color standard ID) to inform the mill of the desired result.

Sample Development

A) The designated apparel brand production team provides supplier recommendations to the sourcing team, who selects the supplier.

B) The designated apparel brand production team communicates and works with the supplier's mill to match the Wash Inspiration Target from either an existing mill library and/or through new piece-dyeing development.

Figure 4. Detail of an unwashed sample wash panel with a seam

C) The mill must identify the proper fabric construction and dyestuffs for use based on the washdown level indicated on the Wash Inspiration Target in addition to direction supplied by the apparel brand design team included in the Sample Yardage Request Form.

A) The mill produces the initial sample yardage in a sufficient quantity to make enough samples on which to evaluate wash effects.

B) The mill applies standardized washes on sample panels made from the initial sample yardage to show a range of potential wash effects.

C) For each **Sample Wash Panel** submitted, the mill must identify and clearly label a sample of the unwashed dyed fabric from the trial run that produced the yardage used in the submitted wash panel (**Pre-Wash Master Standard**).

D) Mill Recommended Best Practice—The mill should establish good correlation between its own allocation washes and those of the laundries to whom they provide fabric.

E) Sample Wash Panels are submitted through the supplier to the apparel brand production office.

F) The mill sends Sample Wash Panels to the production office, retaining a clearly identified duplicate set of all samples sent.

G) The production office team reviews the Sample Wash Panels to ensure that they are in line with the design team's expressed intent and sends these to the apparel brand design team for review of construction, color/cast, abrasion contrast, and handfeel.

H) If the Sample Wash Panels are deemed not submittable to design, then the production office team works with the supplier/mill to resolve the issue.

I) The apparel brand design and garment processing technical teams review all Sample Wash Panels sent by the production office.

J) If accepted, a designated representative signs and tags the approved Sample Wash Panel.

K) If not approved, but the base fabric is acceptable, then appropriate color or wash direction is provided to the vendor departments (copying Sourcing or Product Development) and new **Sample Wash Panels** are requested.

L) If not approved and the base fabric is not acceptable, then the mill initiates new piece-dyeing development as described in step B above.

Approved Sample Wash Panels

Once a Sample Wash Panel has been approved, the corresponding Pre-Wash Master Standard and its dye recipe must be sent to the apparel brand color office within proper timing for documentation (this is for apparel brand records only and will not be reviewed for approval/rejection).

Figure 5. Before and after—The left leg represents the before wash appearance and the right leg shows the impact of the garment wash. Image generated by newarc.ai.

Figure 6. Detail of a sample wash panel showing color loss in the large sections and high/low's on the seam.

PRODUCTION

Mill

A) The mill dyes the approved fabric to match the color of the Pre-Wash Master Standard with the same dyes used to make the fabric in the approved Sample Wash Panel.

a. If runnability issues are noted in production, the mill must immediately contact the production office and the cutter to inform them of the problem.

b. The mill may consider changing dyes in the recipe to correct the problem, however, all reasonable steps must be taken to assure that new dyes introduced in the recipe will not change the way the fabric washes down at the laundry, since changing dye components will likely impact the final shade of the washed garment.

c. If the mill changes the dye recipe, then the laundry may need to adjust its chemistry or wash procedure to match the original **Approved Garment Standard**.

B) Mill Recommended Best Practices

a. The mill should spectrophotometrically measure all dyed production lots to assure that they meet acceptable shipment limits of 1.00 DE_{CMC} as compared to the spectral data associated with the Pre-Wash Master Standard.

b. Based on the spectrophotometer output, the mill should apply color tapering to each roll of production fabric to streamline shade flow into cut/sew.

c. The mill should periodically run allocation washes to assure that the washdown appearance does not change.

Figure 7. Five washes shown side by side.

Cut & Sew

A) The cutter uses the Pre-Wash Master Standard to assure that all incoming dyed fabric is onshade.

Laundry

A) The laundry uses the Approved Garment Standard to assess the acceptability of all washed garments.

B) The laundry uses the Pre-Wash Master Standard to make necessary bulk wash adjustments.

C) Laundry Recommended Best Practice—The garment production laundry should send approved wash standards to the fabric mill in order to tighten correlation between the mill's and laundry's output.

SHOULD WE DO IT THAT WAY?

That's the way wash finishes are done, but *should* we do it that way? Two different views of denim inform current practices.

Iconic American Apparel

Dungarees are an American icon. They personify the American spirit that won the West. In a sense, Levi Strauss became the outfitter to American Manifest Destiny in the mid to late 19th century. Denim was developed over two centuries ago and eventually enabled dungarees to become the ultimate workwear. It was affordable, could withstand just about any end-use, provided protection, and lasted forever. Those were the needs of cowboys, miners, and other laborers of the time.

Wet processing innovation in the American textile industry eventually reduced the stiff-as-a-board-and-twice-as-rough nature of raw denim without significantly reducing the product life. This continually improved the wearability of dungarees and expanded their appeal beyond workwear.

Cosplaying LARPers

Premium apparel like distressed denim and other vintage washed looks were introduced in the 1970s to mimic what clothes looked like that were actually distressed because of exposure to real working conditions over time. Prior to that, if soft, abraded, faded jeans were desired, you had to go to the washtub in your basement armed with a hammer, rocks, and your own ingenuity to alter the raw denim jeans you just bought.

Marketers got smart as we got lazy. For a premium price, you could look like you actually did manual labor (or rode the range) without lifting a finger. Commercial laundries developed viable ways to make clothes look old without completely destroying them. I remember one program that involved putting tee-shirts on mannequins and inviting a local gun club over to shoot plastic buckshot at the neck openings to simulate wear and tear.

SUSTAINABILITY AND DENIM'S FUTURE

Times have changed since dungarees became high fashion blue jeans. If we are going to be serious about reducing stress on the environment (one facet of sustainability), then we should stop and think about what we are doing. Today, we beat the features out of denim with mechanical, chemical, and electromagnetic (laser) processes to enhance aesthetics, all the while shortening its lifespan. Meanwhile, legions of advocates pitch apparel sustainability, circularity, higher price points, and degrowth at industry conferences. And most of them are wearing…distressed jeans (and they're not cowboys).

Somebody ought to do a Life Cycle Analysis (LCA) on how much sense that makes.

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.

Ken Kiser has managed raw materials, color, and garment processing technical departments at American Eagle, JCPenney, and Carhartt as well as directed plant operations at the Grupo Romatex-Mexico denim mill. His technical qualifications encompass knits, wovens, denim fabrics and their constructed garments. He has successfully led cross-functional teams executing projects involving special functional fibers, performance treatments, garment finishes, and garment constructions that meet aesthetic expectations, functional attributes, cost, and quality requirements.

Notes

[1] This article does not address individual garment finishing, that is, the application of "whiskering" and other individual steps applied to individual garments.

[2] Only the afterwash color should be specified by design, since 1) that is the color that the customer will ultimately see and 2) colors do not necessarily wash down onshade. For exhaust dyed programs, dye recipes are made of trichromies including a red, yellow, and blue component. If one of those dyes washes off at a different rate than the others, then the cast of the afterwash shade will be different than intended. For ring dyed denim, two unwashed panels can look the same before wash, but due to different dye penetration in the yarn, they will look different after wet processing.

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