ADDING COLOR TO THE FABRIC

After fabrics are constructed, most of them are processed through a number of steps to produce the appearance and performance desired for apparel use. Researchers have developed many dyes and many methods of applying the colors and designs to fabrics. In addition, these fabrics may have any number of finishes applied to improve their appearance, strength, hand (feel to touch), resistance to wear, and ease of care.

Dyes and Dyeing

Without dyes, all garments would be gray, brown, or off-white. Most of today's consumers would consider these very dull and uninteresting choices. The dazzling array of bright, muted, and pastel colors in plain, print, stripe, check, and plaid fabrics are possible because of the thousands of dyes currently available.

For many centuries the only dyes available were made from natural chemical materials—from vegetables and animals. These materials worked relatively well with natural fibers but often varied in quality and gave unpredictable results. Today, almost all dyes are made from synthetic chemical compounds and are superior in almost every way to natural chemical dyes.

Some sources of natural dyes in ancient days were:

Vegetable dyes:	Name	Source	Color
	Sassafras	Bark of tree	Yellow
	Indigo	Plant grown in tropical climates	Blue
	Logwood	Tropical tree	Black

Animal dyes:	Name	Source	Color
	Shellfish	Bodies	Purples
	Kermes	Oriental louse	Crimson
	Cochineal	Insect that lives on cactus plants	Red

Some sources of natural dyes today are:

Vegetable dyes:	Name	Source	Color
	Sassafras	Sassafras tea or tree bark	Yellowish tan
	Flesh	Dry yellow onion skin	Pale tan
	Redviolet	Dry red onion skin	Reddish purple
	Mustard	Mustard plant	Bright yellow
	Berry	Beet or berry juice	Reds
	Blueviolet	Blueberries	Blue-purple
	Cinnamon	Cinnamon juice	Reddish brown
	Coffee	Coffee juice	Brown

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Thousands of synthetic dyes have been developed as a consequence of modern fiber and fabric developments. New fibers or fiber modifications may require parallel development of new dyes or methods of color application. Also, consumers now demand wider choices of colors and that dyes be colorfast. The complex procedures of dyeing textiles are now aided by the use of computers. Standardization of dye solutions and dye lots has become a reality because of this technology.

Colorfastness refers to the permanence of dye in fabrics. A colorfast fabric or garment will not lose color through wear or care. Some colors and prints have good colorfastness, whereas others do not. Some dyes, such as those used for madras prints, are meant to run and fade.

The colorfastness of dyes depends on several important factors:

- Matching the fiber's chemical structure to the dye's chemical structure. Dyes that are effective for protein fibers are not effective on cellulose fibers nor are any of these dyes successful with synthetic fibers.

- Adding chemicals or substances that assist in dyeing and printing fabrics. For example, polyester does not take dye easily, so materials are added to the dye bath to help the fibers pick up the dye in a uniform manner.

- Various methods and techniques of dye application. Many methods are used to "fix" colors, that is, to make them permanent.

There are also certain conditions in wear, care, and the environment that affect colorfastness and that should be considered when a manufacturer is selecting a dye for a fabric. Colorfastness of a dye to acids and alkalines is necessary if a color is to withstand perspiration, deodorants, and antiperspirants. Some dyes are not colorfast to sunlight. Fumes and ozone may cause a change in color of some dyed fabrics. Dyes must be colorfast to the products and procedures used to clean or launder a garment. And, most dyes should not crock (rub off), bleed, or run when the garment is worn or cleaned. If these conditions occur when a garment is first worn, they will continue to occur. Check labels and hangtags for information about the colorfastness of a fabric or garment.

Dyes can be applied during any state in manufacturing textile products. The type of fabric or garment will determine whether the dye is applied to the fiber, yarn, fabric, or garment.

Fiber dyeing means that the fibers are dyed before being spun into yarns. It provides evenness of dye penetration and permits the spinning of tweed and multicolored yarns. It is the most costly method for dyeing and the highest fashion risk because the color must be applied many months before the fabric is made into a garment and color demands and preferences may change in the meantime.

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Solution dyeing is possible only with manufactured fibers. Dye is added to the chemical solution before it is forced through the spinneret to form fibers. Therefore, the color is a permanent part of the fiber and very resistant to any type of fading. This method is particularly good for dyeing acetate, which tends to fume-fade easily, and for difficult-to-dye fibers, such as olefins and some types of rayon, nylon, acrylic, and polyester fibers. Unfortunately, the number of colors available with this dye method is rather limited.

Yarn dyeing means that the yarns are dyed before they are woven or knitted into fabric. This method is less costly than fiber dyeing and provides clear colors because of the excellent penetration of the dye into fibers. The major use of this method is to dye yarns used in stripes, plaids, checks, and other multicolored designs. In special cases, yarn dyeing is used for solid color fabrics.

Piece or fabric dyeing means the fabric is dyed after being woven or knitted. It is less costly than either fiber or yarn dyeing and is the most adaptable method for dyeing solid-color fabrics. There is less fashion risk with this method because the color is applied later in the production process and therefore closer to the time of sale. Manufacturers can store undyed fabric and dye it a specific color, according to their orders. If heavy or densely woven fabrics or highly twisted yarn fabrics are piece dyed, there can be a problem of poor dye penetration to the center of the yarns. This problem is not evident when the garment or textile product is new. It will appear after a brief period of wear, which causes the undyed yarn areas to shift to the fabric surface. For this reason most high quality heavy and densely woven solid color fabrics are yarn dyed rather than piece dyed.

Garment or product dyeing means that the fabric is cut and sewn into the finished product and then dyed. This method is successful with limited categories of non-tailored garments, such as sweater, hosiery, and pantyhose. This method has the lowest fashion risk and is relatively inexpensive. Manufacturers can offer wider color choices because they can dye the garments in the colors designated by store buyers' orders.

A number of special dye methods make it possible to dye fabrics that contain two or more fibers with different absorption rates and different levels of attraction or reaction between dyes and fibers.

Cross-dyeing is an example of a special dye method. With this method, a fabric that contains two or more fibers is dyed so that each fiber accepts a different dyestuff and results in a different color. Sometimes the dye process is planned so that certain fibers will not accept any color and will remain white. Therefore, by planning the arrangement of fibers in a fabric, such as a plaid, check, tweed, or stripe, some other design or a muted color can be created with modification of the piece dying method.