



## **High-Performance Fabrics & the Demands of High-Traffic Applications**

### **Standards for commercial upholstery**

In today's upholstery market, customers demand both fashion and function. Performance textiles (also referred to as functional, technical, smart or high-tech textiles), are making strong inroads across the commercial textile market with their elegant, soft designs that can take the abuse of patients, visitors and guests, and still look great. In order to create fabrics that are odor—, UV—, heat—, water—, wrinkle— and stain—resistant, fabric innovators have incorporated the use of chemical treatments, new fibers, and weaving techniques into standard production practices.

### **Fabric considerations:**

Fabric used to upholster commercial public seating needs to provide increased abrasion resistance due to the amount of traffic that the furniture encounters. The performance and durability of an upholstery fabric determines its serviceability, which will depend upon a number of factors, including the construction and use of the furniture, and its maintenance and care.

Many factors contribute to fabric selection in commercial upholstery applications: durability, dimensional stability, soil and stain resistance, appearance retention and fire retardance. Hotel and hospital lobby seating, restaurant seats and booths, as well as family visitation seating in a nursing home facility, will take a tremendous amount of use and abuse. The fabrics must resist rips and tears, and retain their original appearances by providing excellent colorfastness, and stain and soil resistance.

When selecting fabrics for certain applications, upholsterers must consider ease of use. For example, patrons of a restaurant expect to slide in and out of booths without resistance from the fabric-covered upholstery. This ease of seating may not be a problem when selecting vinyl-covered fabrics, but can be a real issue with brushed suede or high-pile constructions.



## **Nanotechnology:**

One nanometer is one-billionth of a meter, which is about 100,000 times smaller than the diameter of a single human hair. Nanotechnology, the manipulation of a substance's structure at the molecular level, is built on the fundamental principle that properties of substances dramatically change when their size is reduced to the nanometer range. Recently, the textile industry has utilized nanotechnology to improve performance and increase the functionality of textiles, resulting in developments that have upgraded existing finishes of products.

In order to provide enhanced performance characteristics, textile applications of nanotechnology have primarily focused on generating nanostructures and/or using nanosized chemicals. These characteristics include barrier performance to water and chemicals, electrical conductivity and reduction of static electricity, UV absorption or protection, and antimicrobial and self-decontamination.

To provide functionality, fluorocarbon and silicone chemistries applied as nanoparticle-sized polymers are attached to fabric fibers during the manufacturing process. Unlike coating the fabric with a protective treatment, this technology actually alters the molecular structure of the fibers. Nanosized molecules are bonded to fiber molecules so the treatment becomes an integral component of the finished product, resulting in higher efficiency. And since nanosized particles are transparent, they do not alter the color and brightness of the textile substrate.

## **Microfibers and ultrafine fibers:**

A microfiber is 100 times finer than a human hair and half the thickness of a silk fiber. A synthetic fiber with a denier of less than 10 is identified as a microfiber. An ultrafine fiber has a denier of less than 1.0 (or a diameter less than 10 microns, which is equivalent to 10,000 nanometers). Microfibers can be constructed of polyester, polyamide, nylon, rayon or acrylic, and enhance the fabric hand to provide a luxurious feel and soft touch.

When microfibers and ultrafine fibers are woven or knitted into fabrics, the end products are compact structures. The resulting weave can create water-repellent or waterproof fabrics, which enhance stain and soil repellency by enabling spills to bead up and roll off before they penetrate the fabric.



Furniture fabrics made with microtechnology for use in restaurants, hotels and nursing homes are impervious to food, wine, felt markers and bleach, and include product brands like Sunbrella by Glen Raven Inc., and Crypton.

### **Stain-resistant finishes:**

Upholstery fabrics with stain-free or stain-resistant qualities are the beneficiaries of new technologies that use nanotechnology in a stain-resistant fluorochemical finish. Fluorochemicals create a barrier to water and soils by imparting hydrophobic character to individual fibers. Stain-protection technologies may also provide dual-action stain protection, as they provide soil repellency combined with stain-release technologies. A dual-action stain repellent/stain release technology functions by repelling water-based stains, while at the same time allowing the release of soils that become stains when they penetrate the finish.

These stain-protection products include StainSmart by Milliken, Advanced Dual Action and Ultra Release Teflon by Invista, and Scotchgard Protector by 3M. For hospitality and commercial interior design fabrics, StainSmart offers stain-release/repel properties, as well as flame-retardant performance. Crypton is a specially engineered fabric system with an integrated moisture barrier that promises permanent stain, water and bacteria resistance.

### **Antibacterial and antimicrobial:**

In the health care market, antimicrobial finishes function by preventing or destroying microorganisms, and preventing the growth of bacteria and mold spores. Antimicrobials can be divided into two types, based on their mode of attack on microbes. The first type is the controlled-release mechanism, which is slowly released from a reservoir either on the fabric surface or in the interior of the fiber. This may be accomplished by utilizing micro-encapsulation of the active ingredient to permit its controlled release. The second type uses nanosized molecules, which are chemically bound to the fiber surfaces. These products control micro-organisms that are present on the fiber surface.

Crypton's Disinfect & Deodorizer utilizes a quaternary hospital-grade disinfectant to create an integrated barrier system that kills bacteria, viruses, mold and mildew. Trevira CS Bioactive, a specialty polyester fiber, is being used to produce antibacterial and flame-retardant fabrics for the hospital and health care sectors. These fabrics remove unpleasant odors and toxic substances, such as formaldehyde, nicotine and ammonia.



A special finish on the flame-retardant Trevira CS fabrics acts like a catalyzer, and provides a clear increase in freshness. Microcare by Microcare International BV, a coated fabric used in the health care industry, includes a standard anti-bacterial and anti-fungal treatment.

Antimicrobial finishes have also been combined with other functional performance characteristics, including water and stain resistance. An example is Crypton's In & Out, which is guaranteed fade-resistant and bleach-cleanable.

### **Care and cleaning:**

When upholstery fabrics in restaurants, hotels and public spaces look dirty, the fabric or furniture piece will typically be replaced. Commercial upholstered furniture is more likely to be replaced because the fabric is soiled than because the fabric wears out. The integration of high-performance textile technologies in the commercial upholstery market can lengthen a fabric's life. At the same time, new technologies have altered the care and maintenance of some products. Most high-performance products can be cleaned, but special attention must be paid to the manufacturer's recommended method of cleaning.

Performance fabrics are a new paradigm for the textile industry and represent one of the fastest-growing sectors of the industry. For the high-traffic commercial upholstery market, the possibilities for performance textiles appear endless. Contract textiles, used in furniture applications, including nursing homes, restaurants, casinos and hospitals, must resist rips and tears, and provide colorfastness, stain and soil resistance, and fire-retardance.

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