



Reducing the number of off goods helps you maintain a profitable business. Image credit: Flickr user Mark Wallace (CC BY 2.0)

It happens. An employee makes a mistake and the carpet doesn't come out the way it's supposed to. A whole roll gets pulled off the line, marked down, and taken off to be piled up with all the other off goods waiting in the truck behind the warehouse. Not the truck that makes you money; the truck to the discount buyer, who will make their cut on the rugs you can't bring anywhere else. Each truckload represents days' worth of machine time and thousands of dollars in materials. It's a shame—especially each time a roll is lost to something preventable, like inaccurate color measurement.

But accurate measurement isn't always a simple matter, nor is it guaranteed by running each strikethrough under a spectrophotometer. The unique material properties of tufted carpet can cause significant difficulties for these machines, and only by systematically adhering to proper techniques can you generate consistent color quality—and cut down on waste.

Challenges Inherent in Tufted Carpet

Spectrophotometers reflect controlled wavelengths and intensities of light off physical materials at specific angles and record the alteration of that light's reflections with finely tuned sensors, using the process to generate a measured, objective reading of color. The only variables the machine does not control are the physical properties of the object it's measuring. Objects of the same color but with differences in texture, luster, or opacity can return different readings.

Tufted carpet, unfortunately, contains differences in texture, luster, *and* opacity within each sample. Because looped yarn does not cover 100% of the carpet's surface, the gaps between the fibers will produce different readings on different backgrounds. Depending on the materials you use, the backing might also be translucent, compounding the margin for error.

The tufting and dyeing process can also result in colors that are directionally oriented or otherwise non-homogenous across a given sample. This means that readings taken from different angles can vary, as can readings taken from different parts of the same sample. While one section of the carpet might pass color tolerance standards, another section might not, and a perfectly good rug could be rated non-first quality and condemned to the off goods pile.

Even the flexibility of tufted carpet can cause an issue for spectrophotometers. Should a sample flex or pillow into the machine's measurement port, you can again be left with inaccurate readings through no fault of your own.



Tufted carpet requires careful sampling for accurate color readings. Image credit: Flickr user Rex Roof ([CC BY 2.0](#))

The Importance of Consistent Color to Profitability

The carpet industry is already known for stiff competition. If you're among the top four players, you're competing for just 55% of total revenue¹—and if you're not, you're among the 215 smaller manufacturers elbowing for a minority.

In other words, wasted time is wasted capacity. Each rolled good that must be reworked due to color consistency issues or inaccurate measurement costs your mill a significant amount of time, from the hours-long dyeing process to the tufting itself. And each day lost to rework reduces the number of orders you're able to take in.

Not only do lost orders directly benefit the competition, they detract from overall efficiency by reducing the scale at which your mill is operating. Given the bulk preferences of both material suppliers upstream and distributors downstream, losses in supply orders and output can seriously increase your overhead. And with few open areas for cost reduction, this sometimes forces management teams to make tough decisions, like authorizing layoffs, simply because there's no other way to recoup losses.



For carpet manufacturers to maintain a competitive advantage, they must stay abreast of new technology. Image credit: Flickr user Fred Ortlip ([CC BY 2.0](#))

Mitigation Techniques for Tufted Carpet Measurement Challenges

Fortunately, with over sixty years of industry-leading spectrophotometric research and practice, HunterLab has developed consistent and effective solutions for color measurement issues in the field [of tufted carpet production](#).

The first step to accurately measuring tufted carpet is making sure the correct spectrophotometer is used for the job. The benchtop [HunterLab UltraScan® VIS Diffuse/8°](#) spectrophotometer comes configured with the proper aperture, light angles, and software to identify carpet color. Because tufted carpet is a semi-translucent material, a non-translucent pad can also be placed behind the carpet to ensure an accurate reading.

The machine's software package is capable of averaging multiple readings, which eliminates the potential of different results due to different angles or non-homogenous dyeing across a sample. Finally, the spectrophotometer can be equipped with a specially designed clamp to prevent samples from pillowing or flexing into the measurement port.

Spectrophotometers are essential tools for color quality control in the carpet production industry. Inaccurate measurements and the resulting waste and rework can seriously damage your mill's bottom line. But by using the proper machine and adhering to proven techniques, measurement accuracy can be guaranteed. For more information, [contact the experts at HunterLab](#).

1. "Carpet & Rug Manufacturing Industry Profile",
2016, [http://www.firstresearch.com/Industry-Research/Carpet-and-Rug-
Manufacturing.html](http://www.firstresearch.com/Industry-Research/Carpet-and-Rug-Manufacturing.html)