

Wood Coatings – Keep the natural look

Wood is one of the most versatile raw materials in the world. It creates a warm and comfortable atmosphere and is therefore, often used for furniture and parquet flooring. A living room table or a kitchen cabinet plays an important role in defining a home's personality. On the one hand, fresh and exciting looks are demanded by consumers; on the other hand, the natural look should still be noticeable. Due to its individual character, the measurement of color and gloss on wooden surfaces are of special challenge.

When being used for furniture, wood coatings have to fulfill two main requirements: they have to guarantee durability and resistance against a variety of household chemicals and solvents, but at the same time the product has to look nice and esthetically appealing.



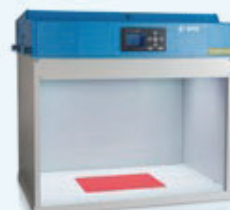
Depending on the exclusivity of the furniture, different “types” of wood are used. High-end furniture is made out of natural solid wood or veneer, whereas inexpensive products are made of plywood. Solid wood is usually covered with a clear or tinted stain that is applied in different ways determined by the geometry of the part. Flat parts like boards and cabinet doors are coated by rolling or flowing when being processed by a flat conveyor line. More complicated shaped parts like chairs or complete furniture pieces are hung on carriers and sprayed. Plywood can either be coated with an opaque solid coating or laminated with a thin paper film of different design ranging from solids to wood grain imitations.

As design decisions are often made at different locations than manufacturing takes place and parts from different suppliers worldwide are assembled to the finished product, a reliable color and gloss control is crucial. A color instrument using a sphere (d/8), specular-included geometry is best suited to measure color variations on wooden surfaces. Depending on the gloss level of the sample, either a 60° or 20° gloss measurement is recommended additionally.

BYK-Gardner Solution



Color & Gloss
spectro2guide



Objective Visual Evaluation
byko-spectra *pro*

Color measurement

The first step for a reliable color control system is to ensure that the defined “look” can be sufficiently reproduced in any manufacturing environment. Therefore, standards with reasonable tolerances have to be established between customer and suppliers. A color spectrophotometer like the spectro2guide can be a valuable tool in the process, because it can save standards together with their tolerances. This eliminates the error that physical wood standards easily change over time and reduces storage capacity of reference samples. After this has been done, regular production control can be performed on the finished products. As long as the surface is homogeneous – like with solid colored plywood – color measurements can be performed easily. The challenge starts when wooden grain becomes visible.

Laminated plywood

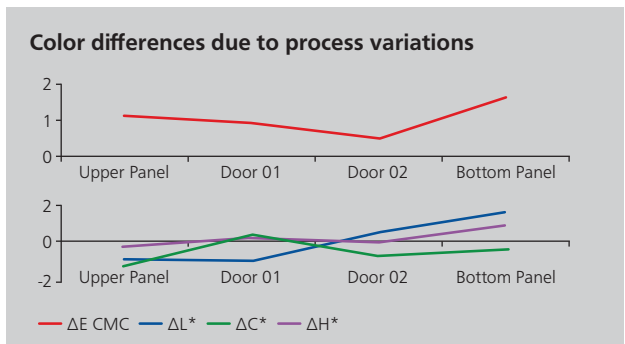
The imitation wood grain is printed on a thin paper film, which is then glued onto the plywood. The print follows a certain pattern and therefore, measurement locations can be easily defined to make sure to always measure on the same spot. Dependent on the size of the product an average of 3 to 5 readings is recommended. To improve repeatability and reproducibility, a template with cut-outs can be created to clearly define the measurement spots.



Solid wood or veneer

As every tree is different, also the wood panels processed from it are “living materials” that will never look the same. The challenging factor is the irregular pattern of the grain which still can be seen through the transparent or semi-transparent stain. When doing an evaluation, either visual or instrumental, one has to focus on the “dominant color”. This means that knotholes and the surrounding areas as well as extremely light or dark areas should be excluded. The remaining area is then measured by taking an average of 6 to 9 readings. Color differences of light colors that can still be accepted are in the range of +/- 1 $\Delta L^*a^*b^*$ and for dark colors in the range of +/- 1.5 $\Delta L^*a^*b^*$.

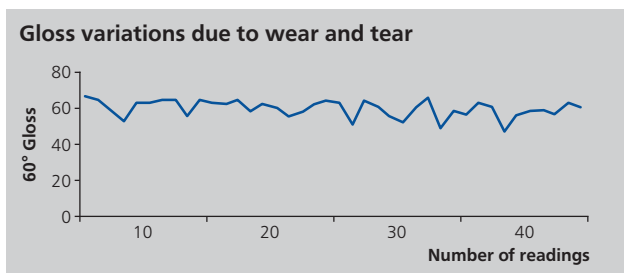
Process variations measured with the spectro2guide can be analyzed in trend graphs. The following graphs show data for a chromatic wood stain being applied on different furniture panels.



To obtain good correlation between visual assessment and instrumental readings, the samples shall be viewed parallel to the grain.

Gloss measurement

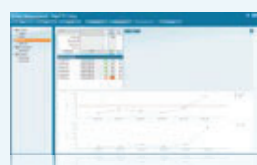
Dependent on the type of coatings (waxes, oils, varnishes, shellacs, lacquers, and water-based finishes), different looks can be created from very matte and dull up-to high gloss surfaces. Gloss variations are very obvious on large surfaces like furniture panels and parquet flooring. The micro-gloss offers a quick solution for objective quality control. In “continuous mode” the instrument conveniently scans large areas and checks gloss uniformity. Up-to 99 measurements can be taken at a defined interval and as a result the display shows the average value of all readings as well as the minimum and maximum value. In the graph below gloss variations of parquet flooring in a living room are charted. Scratches and wear mark spots result in lower 60° gloss values.



On smaller samples it is sufficient to calculate an average gloss value of 3 to 5 readings. As wooden surfaces have a certain preferred direction based on the grain and fiber orientation it is very important to define the measurement direction of the glossmeter. A common way is to take readings in the fiber direction where the wooden structure is visible.



Gloss
micro-gloss



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