



MASC-FOQUS

COLOR CLASSIFICATION FOR QUALITY CONTROL

Textured, colored surfaces

If finest color shades of structured surfaces are to be evaluated, neither human controllers nor classical color measurement systems can cope with the problem. The color differences determined visually can hardly be reproduced because they strongly depend on

the observer and the surroundings. Color measurement tools cannot be applied since they work on the basis of an unstructured homogeneous surface. Especially for the solution of these problems, the software FOQUS has been developed at the Fraunhofer ITWM.

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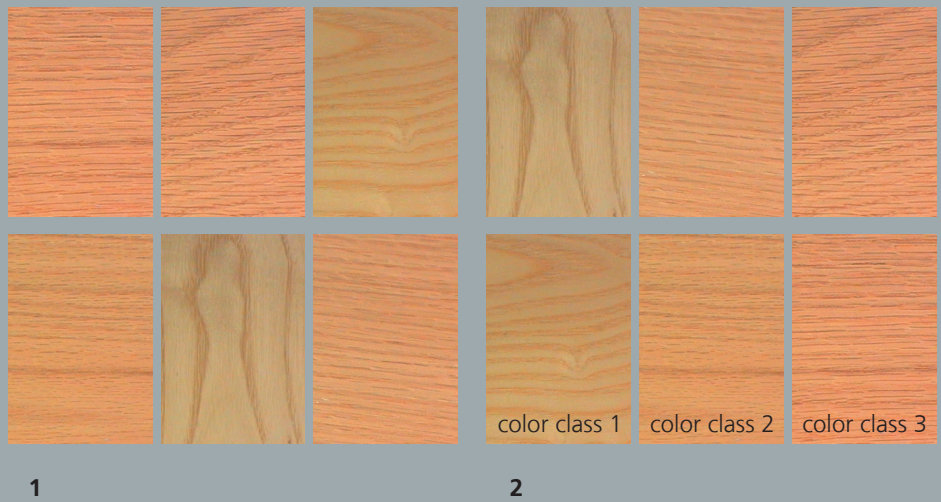
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Application examples

- sorting of veneering in the furniture producing industry
- objective: combination of woods with identical color shades and identical grain
- Quality control of leather interior facings in the automobile industry
- objective: Quality control of outgoing goods to avoid bad deliveries

Fields of application

- Textile, paper, fleece industries (dyeing and printing processes)
- wood and furniture industry (veneering, furniture components, facings, ...)
- automotive industry (interior facings, leather, mounting parts, ...)



1 unsorted sample

2 color classification

MASC-FOQUS: application

Scope

In many fields of processing industry (e. g., wood, leather, paper, wallpaper, fleece, etc.), the evaluation of the processed materials with respect to their visual features, such as color and contrast, is a decisive quality criterion. Particularly in the wood processing and furniture producing industry, a repeatedly occurring problem is the sorting of components with respect to corresponding colors, or the controlling in order to guarantee color constancy. The grain enormously inhibits the application of classical color measurement systems. The sorting according to color features is mostly carried out by hand, which by nature provokes mistakes.

Solution

The software tool FOQUS is able to extract objective color and structure parameters from structured surfaces by methods of image processing, and to classify them automatically, thus allowing a perfect sorting of materials with relatively homogeneous colors and textured surfaces.

Inspection process

The system is based on a standard CCD color camera and allows the objective detection of finest color differences of structured surfaces. The RGB pixel values provided by the camera are transformed into the HSI colorspace which corresponds better to the human perception of colors. This nonlinear transformation separates the information about color and brightness, resulting in a simple compensation of brightness variations. Based on the HSI images, features are computed which describe the structure and color properties of the actual sample. The system is supposed to decide according to similar criteria as the human controller, therefore it is presented with pre-sorted samples in the training phase. Based on the feature values of these reference samples, optimal separating planes are computed in the feature space, which allow a correct assignment of new, unknown samples.

Product properties

- easy adaptation to certain applications by the specification of color samples
- system calibration for the compensation of varying and inhomogeneous lighting
- sorting according to color shades in the case of textured surfaces
- classification into several categories
 - online/offline classification
 - decision: good/bad
- possibility to separate very similar color classes