In this study, the RVM characterizes only one dimension of the facet tilt. If a local physical surface region is inclined out of the measurement plane (plane of incidence), that inclination is not characterized into the facet tilt measure. It is however possible to extend the one-dimensionality in the angle descriptor of the RVM to a complete two-dimensional (2D) angle description. This could be done by performing two measurements of the same physical surface, the sample being rotated 90 degrees around the axis normal to the surface for the second measurement. The two RVM’s could then be merged. Problems arise however concerning the matching of the two measured RVMs, both in rotation (around the axis normal to the surface) and translation. With a spatial resolution of 20 µm, the matching must be performed by image analysis or some other signal processing tool, not merely by manually positioning the surface for the second measurement. This approach was tested for one particular surface; not one of the set of evaluated surfaces. The matching was performed on a semi-manual basis, where the measured data was aligned by introducing rotational and translational corrections on a computer after the measurement in order to achieve the necessary resolution and precision. A simulation based on such a full 2D-facet inclination RVM is shown in Fig. 9. The sample was a “Light Weight Coated” paper printed in a heat-set offset printing press, a product sensitive to improper production conditions. The virtual sample holder in the visualization tool is set to equal curvatures in the x and y directions.

Gloss, as has long been known, is a visual concept far more complex than the present methods of instrumental gloss evaluation are able to characterize. However, a newly developed measurement principle for gloss characterization gives perceptually relevant gloss information. The characterization results in a “Reflectance Vector Map” (RVM) which simultaneously contains spatially resolved information about directed reflectance and apparent inclination. The present work uses the RVM and a rudimentary model of a virtual optical environment to interactively visualize a simulated surface. The performance of the visualization environment has been evaluated by comparing results from two visual assessments of perceived gloss homogeneity for a limited but demanding set of black printed paper surfaces. Assessments were performed both on the physical surfaces, and on the computer-generated visualizations of the same surfaces, reconstructed from the corresponding RVM’s. The results correlate well, with a less inter-judge variance in the visualization environment than with the physical surfaces.

It is suggested that this visualization environment may be a powerful tool for gloss assessment, able to mediate perceptually important characteristics of gloss.

Appendix

An interactive Gloss Visualization Environment—For Measured or Simulated Surface Data

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Figure A1. This snap shot from the visualization interface, is based on a 2D facet angle characterization of a sample. The sample is considered to be of low gloss quality as the glossy surface has a pronounced surface topography causing the gloss variation to be easily perceivable. The sample is a Light Weight Coated printing paper, printed using heat-set offset printing technique where the process conditions have been ill tuned causing this bad gloss quality. However the surface is collected directly from a commercial magazine.