Industrial characterization of nano-scale roughness on polished surfaces

We report a correlation between the scattering value “Aq” and the ISO standardized roughness parameter Rq. The Aq value is a measure for surface smoothness, and can easily be determined from an optical scattering measurement. The correlation equation extrapolates the Aq value from a narrow measurement range of ±16° from specular to a broader range of ±80°, corresponding to spatial surface wavelengths of 0.8 μm to 25 μm, and converts the Aq value to the Rq value for the surface.

Furthermore, we present an investigation of the changes in scattering intensities, when a surface is covered with a thin liquid film. It is shown that the changes in the angular scattering intensities can be compensated for the liquid film, using empirically determined relations. This allows a restoration of the “true” scattering intensities which would be measured from a corresponding clean surface. The compensated scattering intensities provide Aq values within 5.7 % ± 6.1 % compared to the measurements on clean surfaces.

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