

The visual perception of a surface is strongly influenced by the proportion of light with specular reflection from that surface. As an inspection criterion it is equally as important as colour. The optical properties of gloss analysis depend on a range of variables

Measuring visual perception of surfaces



required requirements when these processes are not adhered to.

PARTICLE SIZE

Besides adhesion, weather resistance and chemical resistance, the appearance is one of the most important conditions for the fulfilment of the required profile.

Essential for the gloss measurement are those pigments that are directly under the paint surface. The actual particle size distribution is critical to the gloss of the coating. Factors, such as refractive index of each pigment, light incident angle and surface properties, affect the gloss. These conditions must be optimised during the development phase.

The refractive index indicates how intense the incident light is refracted and reflected. The smaller the index of refraction, the larger the pigment particle size must be. With an identical refractive index of the binder-pigment-mixture there is no dispersion. Interactions and absorption between the inner coating and the incident light does not take place. The grist seems to be translucent or transparent.

The visual awareness of gloss will occur, when light is reflected at a certain angle to a surface. A rough surface scatters the incident light, which falls back at a different angle. The surface appears matte or flat. On the contrary, the incident light on a smooth surface reflects at the same angle and the surface appears glossy. The smoother the surface, the greater the achievable degree of gloss.

Colourant is the generic name for all colouring substances, which are divided into dyes and pigments, chemical composition and colouristic characteristics.

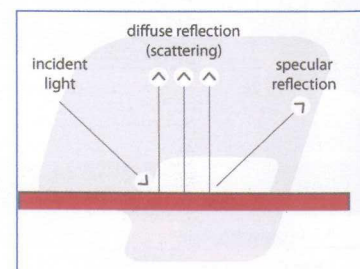
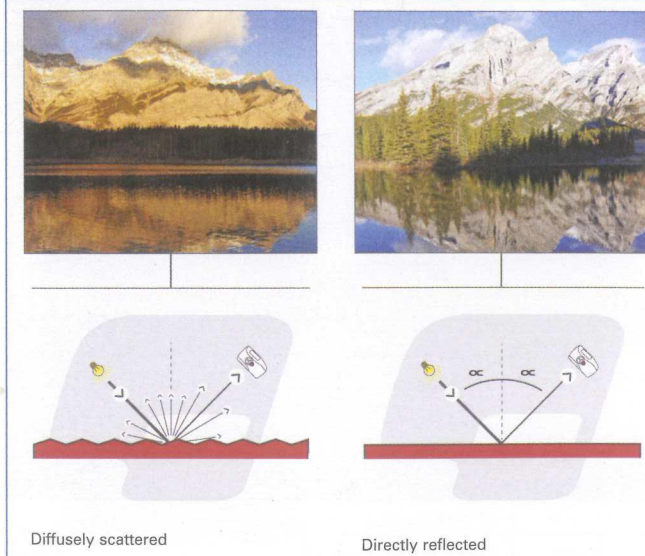
In contrast to dyes, pigments are insoluble in the application medium. This makes pigments the most important part of the colourants. They impart colour and show well covering features.

Pigments are chemically divided into inorganic and organic. The latter are smaller in particle size and differ in scattering power,

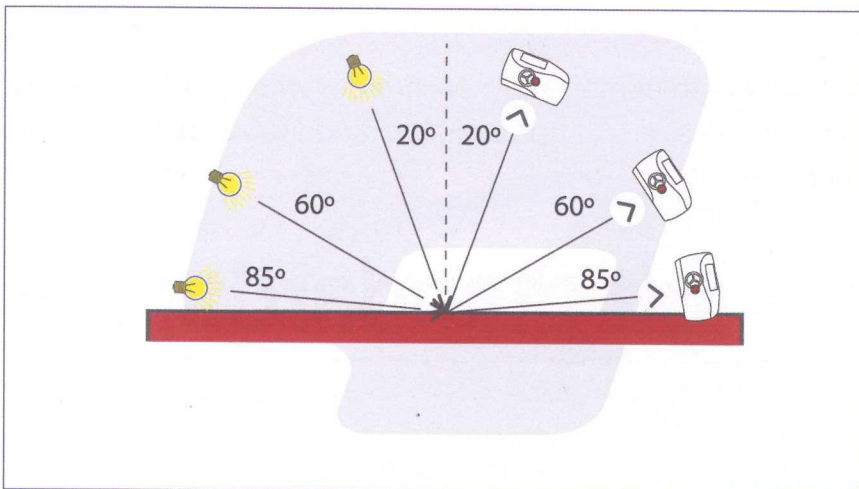
Due to increasing demands on materials, environmental and VOC directives, the nature of the individual components in the coating recipe is of great importance. It must be ensured that the grist, consisting of a pigment filler mixture or binder, is adequately wetted throughout the dispersion process.

The comminution of agglomerates and aggregates in ideal distributed primary particles are part of the dispersion process, as well as the stabilisation of the grist against flocculation. The compatibility of each component has a very specific role in the medium. Incompatibility and precipitation in the system will have an effect on the appearance and gloss. The subsequent coating material will not reach the

The refractive index indicates how intense incident light is refracted and reflected



Authors:



A 20° angle is suitable for measurements in the high-gloss area

density, colour strength, temperature resistance, hiding power, brilliance and dispersibility.

There is a direct correlation between particle size and gloss. The smaller the particle size / particle size distribution, the higher the gloss level that can be reached.

As organic pigments have a relatively small particle size, however, they require more binder to the wetting. The proportion of organic pigments in the paint formulation shall consequently not exceed 5%. Exceeding this limit may lead to a critical pigment volume concentration. This also may lead to changes of the gloss – the surface looks dull.

GLOSS LEVELS

In order to obtain a required gloss level of a surface, the gloss level is divided into high, medium and low.

Normally almost all surfaces are measured with a 60° angle. An improved differentiation is described in ISO 2813 standard. When the 60° angle measures a gloss level higher than 70 GU, it is advisable to apply a 20° angle. The 20° angle is ideal for measurements in the high-gloss area.

On low-gloss surfaces, with values less than 10 GU at 60°, it is recommended to measure with an 85° angle.

Thus, the angle to be set in the glossmeter is dependent on the gloss of the coating. The glossier the coating, the smaller the measurement angle must be.

For the development and for the quality control of surfaces TQC has developed a new product range. TQC, for more than 30 years a global developer and manufacturer of test and measurement equipment, has recently introduced its own gloss meters. The TQC gloss meter is available in three different models. SoloGloss 20°, DuoGloss 20°/60°

and PolyGloss 20°/60°/85°. With these series of gloss meters, attributes of almost any surface can be controlled and optimised.

ACCURACY AND REPEATABILITY

To make sure that all test and measurement devices correlate with the relevant standards, examination by an independent and certified laboratory is necessary. When measuring gloss, particular attention should be paid to see if the average values are exact values. A gloss meter with a high reproducibility and, thus a good repeatability, doesn't necessarily measure accurate values.

Therefore, in the development phase of gloss measuring equipment a round robin test was carried out to examine the accuracy and the resultant repeatability. The accuracy is determined by multiple reviews of a 'sample'. Under the same research conditions, the same results must be achieved.

Thousands of measurements on certified substrates need to be performed. The average value is compared with the nominal value of the certified substrate. The resulting difference between the average value and the true value is called variance. Using this difference, a statement about the accuracy of the measuring equipment is made. These kinds of proficiency tests are also conducted by the Federal Institute for Materials Research and Testing (BAM) or the Standards Committee.

The TQC gloss meters have been subjected to such a proficiency test, to ensure that this is one of the most accurate gloss meters on the market. All important criteria such as precision, reproducibility, reliability, stability, were examined. The overall quality of TQC gloss meters was confirmed with a high consistency of these criteria. ■

