Inline coating of polyester films for optical applications

The demand for large-sized LCD televisions remains high and therefore the need for high quality polyester films is still a very important topic for film producers. The quality of polyester substrates for optical applications is mainly determined by a high transmittance and a very low haze value. Another indispensable property for prism base films is to offer a suitable surface chemistry to ensure a good bonding to other materials during further converting steps.

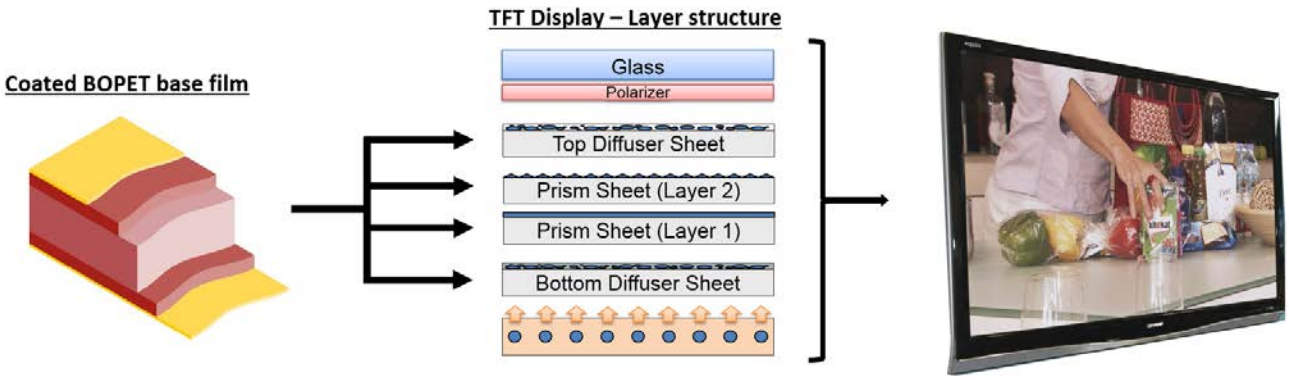

Figure 1: LCD panel and basic layer structure

The best way to add value to polyester films is to find a proper coating formulation to improve the mentioned properties or to create completely new functionalities. For most applications, a coating layer in the nm-range is sufficient to enhance the required properties and therefore Brückner's inline coating technology offers the best compromise between coating thickness and maximum line efficiency. The benefits of double side coated films are listed below and were successfully tested on Brückner's unique pilot line, which is equipped with an inline coating system from German specialist Kroenert.

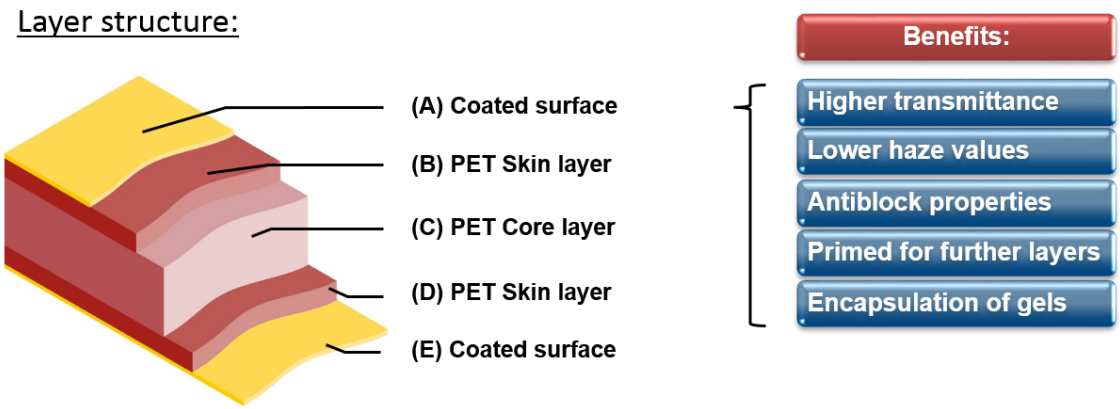

Figure 2: BOPET layer structure and resulting benefits

To increase the amount of transmitting light, various coating materials were tested for their reflection-reducing effects and their homogeneous stretchability. In addition to the selection of the most suitable raw materials, the optimum layer thickness to create destructive interference was investigated. This ensures an additional reduction of reflected light and helps to improve the visual appearance.

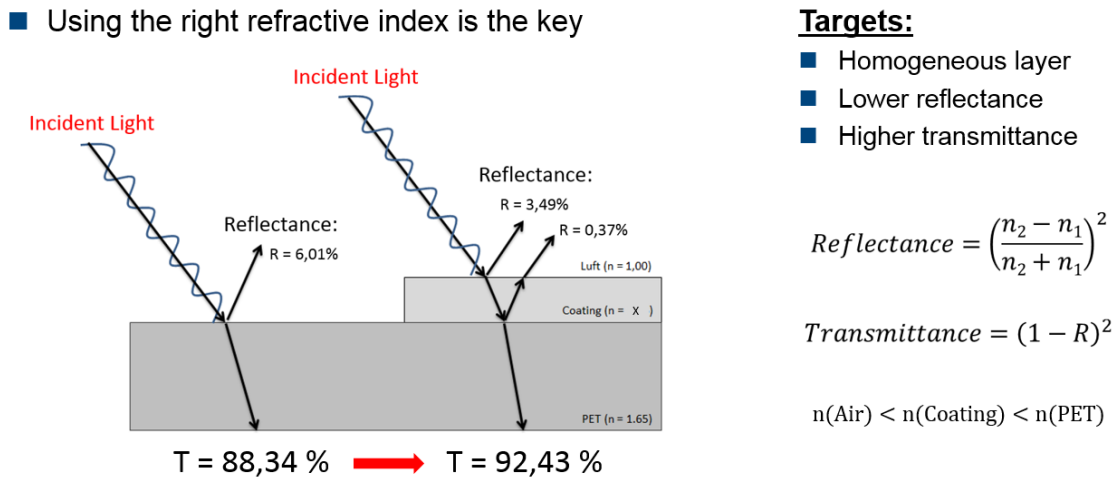

Figure 3: Simplified presentation of a reflection-reducing top coat

The largest impact on the haze values of BOPET substrates has the current use of anti-block particles in the outer layers. To reduce the haze value, a suitable alternative to the present anti-block technology was investigated. Modified nanoparticles in various dimensions and different amounts were embedded in the coating layer to optimize the surface characteristics and thereby to achieve a sufficient anti-blocking effect. The use of stabilized colloidal silica as a filler combined with compatible coating formulations ensures a very homogeneous distribution of the particles on the film surface without harming the optical properties of the film.

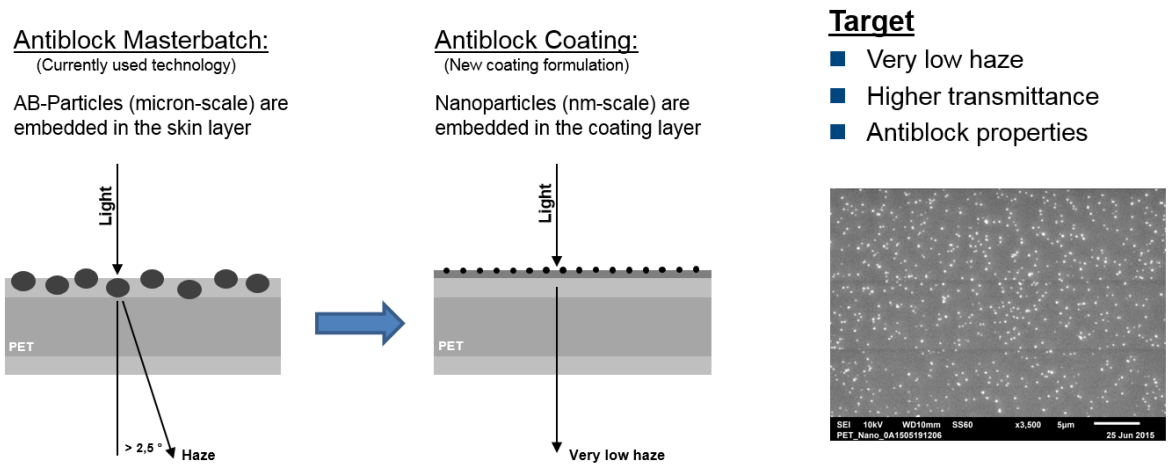

Figure 4: Simplified presentation of reduced light-scattering by using modified nanoparticles

Conclusion:

By using Brückner's inline coating technology and the newly developed coating formulation, it is possible to achieve the required anti-blocking effect with a significantly lower impact on the haze value compared to the currently used technology. The particles are embedded in the coating matrix, which is also able to reduce the light reflection and thereby leads to a noticeable increase of the light-transmittance through the coated substrate. Additionally the applied coating material works as a primer for further converting steps and helps to ensure a good bonding to other functional coating layers.

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