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Research area: Product aims

Packaging papers and paperboard // Packaging papers and paperboard

Key words:

coating, surface smoothness, optical properties, mechanical properties

TITLE:**REFLEXPACK: Development of a multi-ply cardboard with a high glossy surface and maximum bending stiffness****Background/Problem area**

Consumers all over the world expect sensible packaging with a focus on the protection and freshness function as well as space-saving design, easy disposal and environmental impact. To induce impulsive consumption, fineness and culturability come to the fore. That is why there has been a sharp increase in the demand for packaging materials with excellent construction design and graphical appearance. However, the design of a high-quality packaging means a significant cost increase and because of the resource scarcity we are forced to save raw materials. For folding carton producers, it means producing more quality products while increasing sustainability to remain competitive and to raise the general awareness of increasing environmental responsibility.

As the trend to package printing processes increases, the requirements for cosmetics and food packagings are very high. Most of them have to deliver high expectations like good printing and finishing properties, good processability, high volume, trouble-free packaging and legal compliance. To produce high gloss and smoothness values, coated board is supercalendered either on-line in some cases or in a separate production step. This reduces the board volume with a significant loss of bending stiffness. In this regard, the main goal of the REFLEXPACK project is to develop a coating concept of high gloss and surface smoothness in the absence of calendering which leaves bending stiffness of the base board more or less unaffected.

Objectives/Research results

The lack of gloss through abandonment of calendering has to be overcompensated for by a new coating concept to be developed.

Gloss on a surface is created when light and reflection are produced. Irregularities in the surface finish disturb the reflection and cause undirected reflection with increasing unevenness/roughness. The topography of a surface on a micro-scale therefore has a significant impact on gloss. Calendering cardboard is the standard method for producing smooth surfaces with appropriate gloss.

The project therefore focuses on developing a coating concept which results in a defined macro- and micro-roughness in conjunction with the index of reflection to provide high glossy cardboard surfaces without calendering.

To produce highly glossy and smooth cardboard without calendering, a triple coating layer is recommended. The best coverage of the base board is achieved through the use of Precipitated Calcium Carbonates (PCC), especially Calcite. For the middle coating layer fine pigments such as titanium dioxide and alumina trihydrate in combination with fine calcium carbonate are notably expedient. A high gloss of the cardboard is achieved by the use of small amounts of hollow sphere pigments, barium sulfate and lithopones, in combination with ultrafine kaolin. In summary high gloss and smoothness can be achieved without calendering. Also a strong correlation between roughness and gloss has been proven.

Application/Economic benefits

Research results are of use along the entire value chain beginning with cardboard manufacturers and ending with producers of cardboard. In addition, the results are of major importance for packaging manufacturers and packaging printers in particular.

An economic benefit can be achieved by saving raw materials through the use of lightweight substrates as well as in a reduced number of production steps including the development of a product which does not yet exist on the packaging market.

This means a cost savings for the individual company involved, an expansion of the product portfolio and/or a rise in sales. Increased competitiveness is also associated with it.

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Remarks

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