Title:
Curtain coating the precoat and middle coats to optimise board quality – Optimum product quality and curtain stability when using surface-active chemicals

Background/Problem
The optical appeal of packaging materials plays a major role in persuading consumers to buy a product. Folding boxes of paperboard and solid board provide a wide variety of possible surface designs and therefore command a large share of the total packaging market. The pressure of rising costs is making it necessary to use secondary and unbleached pulps in the production of folding boxboard. The coating, whose function is to ensure printability and brightness as a symbol of quality, serves more or less to cover up this darker foundation.

The curtain coating process has proved to be particularly well suited for applying thin contour coatings with very good coverage of the base board. In order to apply thin coating layers at relatively low production speeds in the production of folding boxboard, it is necessary to adapt the properties of the coating colours to these conditions by including suitable additives to prevent the curtain from becoming unstable. This also explains why the surface-active chemicals that are used must possess high mobility in the coating colour and must not impair the functionality of the coated board.

Research objective/Research results
The objective of the project is to utilise the advantages of curtain coating in applying precoats and middle coats to boards to achieve very good coating opacity and low coat weight in this way. To ensure a stable curtain at production speeds that are now common in board production and still be able to minimise the coating layer thickness, surface-active substances (especially surfactants and special-purpose rheological additives) must be used to reduce surface tension of the coating colours.

The project aims at achieving the following results:
- Gathering information to explain the relationship between the mobility of surfactants in the coating colours and the dynamic surface tension in water.
- Providing evidence for the interaction of surfactants with other coating colour components
- Pointing out possible limitations to the applicability of curtain coating with respect to the coating process and overall functionality of the coating board.
- Developing possibilities for reducing
  - the curtain thickness when the curtain coater is operating under stable conditions and
  - the consumption of resources and the costs of coating board.

By using surfactants in coating colours, the curtain stability is enhanced compared to a surfactant free coating colour (up to 25%). But whether the surfactants are micellar or not, HLB value, solubility limits, foaming tendency etc. have to be evaluated carefully for each coating colour in order to ensure process capability.

Application/Economic benefits
The research project focuses on optimising board for the production of folding boxboard. In addition to the actual coating process, the overall functionality of the packaging material is also being taken into consideration. This will allow both paper converting companies and companies that develop and sell special-purpose chemicals to benefit from the expected results.

The use of curtain coaters makes excellent base board coverage possible by virtue of the coating layer without having to use cost-intensive and in some cases particularly abrasive coating colour components such as titanium dioxide. Cost advantages can be expected for producing and converting board (less knife wear). New requirements on process chemicals used in the new coating system are making new products necessary. Rapidly responding small- and medium-sized enterprises can quickly bring such new products to production maturity, thus gaining a competitive edge for themselves.

Project period:
01.05.2006 – 30.04.2008

Remarks
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