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Research area: Process aims

Paper, paperboard and board // Surface treatment

Key words:

Label, adhesive, magnetic induction

TITLE:

Producing linerless self-adhesive labels using an induction-activated adhesive layer

Background/Problem area

Self-adhesive labels are used in a wide variety of different applications. Since self-adhesive labels are always sticky, they usually have a siliconised backing sheet. This backing sheet, known as release paper, has many different drawbacks, however. It increases the weight and volume of a roll of labels. This means not only higher manufacturing costs, unnecessary transport and storage costs but also eventual disposal of the release paper. After application of the self-adhesive labels, the release paper has to be wound up and disposed of. This causes additional costs. Moreover, the siliconised paper is ecologically questionable.

Objectives/Research results

The objective of the research project is to use a new, economically and energy-efficient technology based on induction-activatable adhesives for joining the label and substrate, however, without having to use backing sheets such as silicone base paper.

Heat-activated labels are a promising approach for saving backing sheets. Up until now, efficient heat transfer constituted the greatest technological obstacle. Instead of using an external heat transport, the adhesives are heated directly in the adhesive layer by induction in the presence of nano ferrites without heating up any other workpieces or temperature-sensitive substrates prior or simultaneously to the process. The heat is simply transported out of the adhesive layer. Induction activatable labels combine the economic advantages of a linerless self-adhesive label and the efficient energy transfer of induction technology so that linerless self-adhesive labels can even be developed as an ecologically meaningful alternative to current self-adhesive labels.

The project comprises a first part dedicated to producing suitable adhesive dispersions whose adhesive-related properties and application to label paper are to be studied in the second part of the project. Laboratory-scale trials will be conducted that serve to develop an inductively heatable adhesion layer on the one hand and, on the other hand, to achieve optimal application concepts for coating label paper. Examination has focused in particular on the optical properties, the printability and inductively heatable layer on the rear side of the label. Thermally insulating coating layers were tested to achieve a longer wet life for the adhesive dispersions during application. If the cooling rate of the adhesive layer is too rapid, the wet life becomes a limiting parameter in the application of labels.

The findings that are obtained on the laboratory scale have been implemented on a pilot coater, supplemented by a drying configuration for producing an induction-activatable adhesive layer. As the final step, the adhesive coated label paper was printed by offset and flexographic printing on an industrial scale.

Application/Economic benefits

The life cycle assessment of the self-adhesive labels is greatly improved due to the elimination of the silicon-containing backing paper. It the nano ferrite pigments can be successfully recycled as well, the life cycle assessment of induction activatable self-adhesive labels will be improved even more.

The growing public awareness in the area of life cycle assessments currently makes it possible to achieve higher prices on the market for especially effective technologies combined with high protection of resources.

In so doing, label printers (predominantly SMEs) will profit from the new technology to a disproportionately greater extent, since customers will be spared the disposal costs of the siliconised backing sheet of conventional self-adhesive labels.

New products and new markets will be opened up along the process chain in the industrial sectors mentioned above, in particular in the areas of adhesives raw materials, adhesives, labels (predominantly SMEs) as well as induction and labelling facilities (predominantly SMEs).

Period of time: 01.11.2010 – 30.04.2013

Remarks

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