

Embossing of the Paperboard and the Effect of Polymer Coating on Local Deformation

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Abstract.

Embossing is used in packaging solutions as an additional tool to improve the appearance of the product but can also be used to increase product safety by improving functionality and identifiability of packages. In packaging use, the paperboard has to be polymer coated in order to have sufficient barrier properties. Especially in food packaging, there is a risk that the local stresses caused by embossing will break the structure of the board, thereby losing its barrier properties. Additionally, polymer coating influences material convertibility. This study investigates the effect of polymer coating layer on the embossing process. To produce an embossed shape, a precision tool presented in Figure 1 was made consisting of two parts: male and female moulds. An electrical heating system was also built in connection with the tools, whereby the material forming can be improved if necessary.



Figure 1. Embossing testing tool setup.

The tool embosses a pattern similar to ones often placed on the bottom or on the walls of the packages. Selected pattern is demanding from material's point of view because it has almost vertical edges and a large maximum depth. Local strains up to 40% are needed to form this pattern. The test material for forming experiments was a three-layer sbs-board, typically used in the production of food packages. The embossed samples were visually analyzed by means of microscopy and topography. In addition to the degree of damage to sample materials, material thinning during processing was investigated. The results of the study show that the plastic coating significantly supports the board during embossing process and despite the local thinning of the material, its tightness properties are maintained. In addition, it was discovered that difference in surface friction between two sides of the material influences the quality of the end result.