

## **UV - curable coating process on CMYK - printed duplex paperboard, part II: effects of nano - TiO<sub>2</sub> modification**

### **ABSTRACT**

The influence of TiO<sub>2</sub> nano-particles (nano-TiO<sub>2</sub>) was studied relative to the mechanical and optical properties of CMYK printed paperboard after coating with a UV-curable varnish. Commercial duplex paperboard (glazed grayback paperboard, 230 g/m<sup>2</sup>) was printed with a CMYK offset printing process. Board samples were coated with a nano-TiO<sub>2</sub> modified UV-curable varnish at four treatment levels (0, 0.2, 0.5, and 1%) using an industrial screen-coating machine. The samples were then dried using a UV lamp in an industrial UV drying machine. Sample discoloration was measured spectrophotometrically using CIELab parameters (L\*, a\*, b\*, and ΔE) before and after coating. The whiteness, brightness, fold, and tear resistance of the ink films were also measured. The nano-treatment had a significant effect on the relative optical parameters, which resulted in increasing the lightness of the treated samples. Color change (ΔE) was recorded for all tested samples, and an unperceivable change was observed in case of the nano-treatment with 0.2% as the end value. The weakly perceivable changes were found in the cases of treatment with 0.5 and 1% nano-intensities. The nano-TiO<sub>2</sub> treatment significantly improved the fold and tear resistance of the samples.

**Keyword:** UV-curable coating; Nano-TiO<sub>2</sub>; Offset CMYK inks; Color measurement; Duplex paperboard; Mechanical properties