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**Research area: Product aims**

Paper, paperboard and board // technical speciality papers

**Key words:**

Décor paper, colorimetry, CIE L\*a\*b\* chromaticity, remission measurements, impregnated papers, laminates

**TITLE:****Controlled adjustment of chromaticity of colored decorative paper laminates****Background/Problem area**

Colored décor papers with the same color specifications are produced at different production periods. In this case it is very difficult to reproduce the same chromaticity of the final laminate from a colored raw décor paper.

In an empirical process the color of the raw décor paper is adjusted step by step in an iterative process by measurement of the raw paper chromaticity, by impregnating and laminating the raw paper, by measurement of the laminate chromaticity and at least by comparison of the laminate with a colored standard. If the color of the laminated décor paper differs more than  $\Delta E > 0.2$  the color of the raw paper is adjusted. This procedure will take place until the color of the produced test laminate matches with the colored standard laminate. In the period of the chromaticity adjustment the raw paper production is stopped until the adjustment of chromaticity is successful. These iterative periods reduce the paper machine time and efficiency. Failed production is rejected too.

**Objectives/Research results**

The project aims of the development of basics for measurements and calculations of the chromaticity changes in the different production steps from colored raw paper to the final colored laminate. This method had to establish on remission measurements of raw papers, of test laminates, and process parameters from the raw paper production. A fast forecast of the chromaticity changes in the laminating process is aimed.

Buildup of a forecast tool for checking the quality of the laminated product before it hits the production of the relevant colored raw décors. The prognosis of the chromaticity had to establish on developed method for the chromaticity forecast without any application of the step by step laminating test process as described.

The development of measurement and calculation methods of the chromaticity changes in the different production steps from colored raw paper to the final colored laminate is ongoing. Different samples of colored raw décor papers and the relevant test laminates from décor paper production were investigated and the basic chromaticity calculation tool developed. The most important fact was the change in luminance in the laminating step. The luminance was reduced by impregnated fibres and fillers which possess the same refracting index as the impregnating resin. Furthermore the reflecting properties inside of the impregnated layer decrease its luminance. In an ongoing step a luminance correction for these facts will be developed.

At first a general method was developed to calculate optical and color parameters of a measured remission spectrum of a white or a stained paper. This procedure calculate the k- and s-Values and the chromaticity coordinates of a paper in the wavelength range of 400 to 700 nm in steps of 10 nanometres for different kinds of light (e. g. D65 and other one). It was found that the remission or opacity loss of kaolins and cellulosic fibres at the impregnation and the pressing stage in the production of paper décor laminates may be calculated by using the SAUNDERSON-Method and an empirical calculation. The empirical calculations were developed on basis of about 40 different décor paper samples before and after impregnation and pressing. These paper samples differ in grammage, fibre, kaolin and TiO<sub>2</sub> content. This successful way will be now adopted on different stained décor papers in the next working steps.

**Application/Economic benefits**

The most interesting application will be in the décor paper producing industry. Impregnated and colored laminates and its raw décor papers are produce from expensive pigments (TiO<sub>2</sub> and colored pigments) and short fibre pulps.

Here an added value is created by increased paper machine efficiency, machine time and an added production volume. On the other side the amount of rejected production will be reduced and expensive special pulps and different colored pigments will be saved.

The chromaticity calculation tool to be developed will help in the control of paper production and the iterative test procedure in lab scale for adjustment of the final colored laminates. Here will be the ability to reduce or save the parts of the laboratory work strictly.

**Period of time: 01.01.2012 – 31.12.2013**

**Remarks**

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