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Project topic: Effect of hydrothermal pre-treatment on the colour of hardwood veneers

SUMMARY

In veneer production, wood logs are hydrothermally pre-treated (soaked or steamed) to soften the wood material for more effective production. When wood logs are heated up during pre-treatment before being rotary peeled into veneer mat, there are alterations in their physical and chemical properties. The study is aimed at determining the effect of hydrothermal pre-treatment on peeled veneer colour. The study aims to answer to the following questions: a) How does the log soaking temperature affect the colour of Estonian hardwoods? b) How does the soaking duration affect the colour throughout the veneer mat? c) How does the delay in drying of veneer affect the colour of Estonian hardwoods?

In this study birch, aspen, black and grey alder wood logs were used. The logs were soaked at 20 ^{0}C, 40 ^{0}C, and 70 ^{0}C for 24 h and 48 h. Following the soaking process, the logs were rotary peeled into veneer mats and subsequently dried at 170 °C to a moisture content not exceeding 5%. Colour measurements were performed using CIELab colour space to determine the effects of these pre-treatment variables on veneer colour.

The results of the study show that the log soaking temperature has significantly influenced birch, black and grey alder veneers colour. Increased log soaking temperature affects veneer colour mostly by making them lighter. Especially when logs are soaked with a temperature above 40 ^{0}C, this lightening effect of high soaking temperatures was caused majorly due to an increase in L* (lightness) coordinates and decrease in b* (yellow) coordinates of the dried veneer sample specimens. The de-yellowing effect on the colour of veneer surfaces occasioned by high soaking temperatures seems to be the primary cause of alteration in colour. The colour coordinate a* (red) appeared not to vary as much across the different log soaking temperatures. The phenomenon is more noticeable with birch and the alder wood species and less on the aspen samples.

The soaking duration of logs before veneer peeling was seen not to influence the colour of dried veneers produced from the different wood species as much as the different soaking temperatures, especially with higher soaking temperatures from 40 ^{0}C. The trends identified in the veneer samples soaked for 24 h were similar, lightening, and de-yellowing of colour with increased log soaking temperature.

When veneer mats are rotary peeled, a delay in drying time would not lead to any notable changes in the dried veneer's colour as seen in the results obtained. This was the case

with all the sample species tested. Although there were differences between the fresh wet veneer samples and the wet ones after 24 hours, these changes could be because, within the 24 h, the wet samples may have lost some moisture through evaporation, which will affect the colour. One thing was clear though, the low standard deviation values seen on the dried veneer samples which were not so in the wet samples. This suggests that wet veneer changes colour rapidly and as such not having a harmonious colour tone before they are subjected to heat during drying. This seemingly rapid colour change on the wet surface could be because of some form of chemical reactions triggered by the moist surface of the veneer exposed to the atmospheric conditions. These reactions certainly will not be possible upon drying and such could be the reason the dried veneer had less variations on their colour coordinates.