

# Changing of veneers' color by heat treatment

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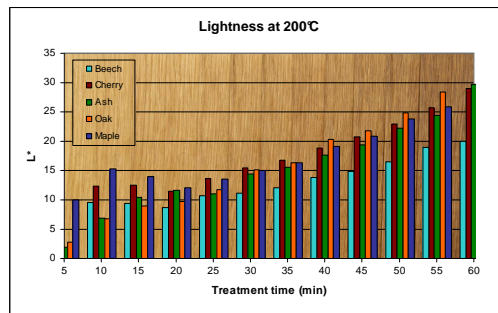
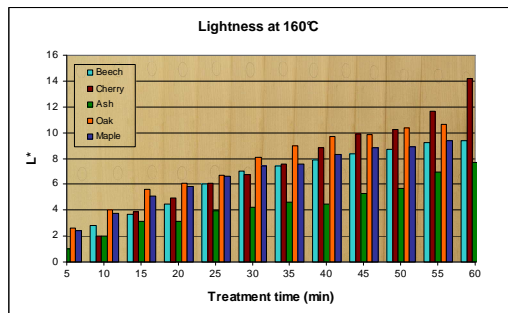
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The wood gentled with heat treatment is flourishing today. Across Europe, increasing the demand for heat-treated wood materials which have dark color, like tropical woods. The research work involved the most widely used wood-species of veneers in Hungary (oak, ash, beech, cherry and maple). The project aims were to determine what color change can be achieved depending on the temperature and time.

There are not seen significant changes in the color coordinates at treatments between 80 and 120°C. The resulted differences in color coordinate clearly defined by the differences in the baseline, control color. This is observed in the case of all color of the components regardless of species. A further trend in color change is predicted on 120°C at the last measurement points (50-55-60 min) the observed increasing changes in color coordinates of some species. It should be noted that on these low-temperature treatment only decrease of the oak's, L\* (lightness factor) is striking, but the other two color factor aren't change.

The spectacular change of the components of color-stimulus is clearly observed at 160°C. For each of the studied species can be said that with the a\*, b\* coordinates change in a positive direction – in proportion of increasing the treatment time – the color will increasingly shift towards the red and yellow, with the decreasing of L\* (wood is darkening).



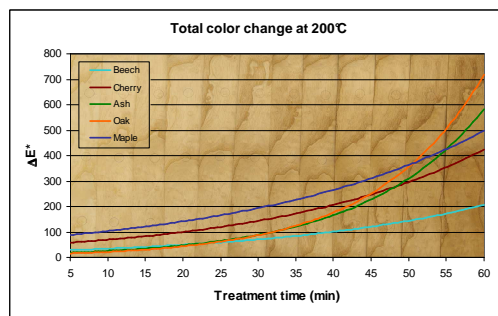
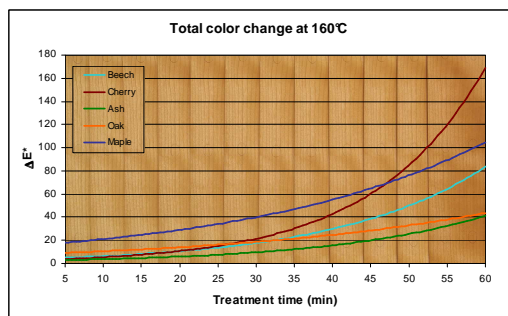
The difference of color-stimulus ( $\Delta E^*$ ) shows the combined effects of color change. At 80°C the calculated values do not show a clear relation to the treatment period. The differences between the measured values reflect to the differences between the control samples regardless of species. A closer relationship has observed at 120°C heat treatment, in case of the oak and beech, but the differences between control samples have significant effect. The observation that the color change between 160 and 180°C increases by leaps and bounds (NÉMETH 1998) is correct for the veneers too, as at 160°C heat-treated samples the measured differences grows significantly and significant the differences between the species.

There was a close relationship between the measured values in time.

	Beech	Cherry	Ash	Oak	Maple
160°C	0,9805	0,9901	0,9603	0,8541	0,9824
200°C	0,9383	0,9363	0,8446	0,9148	0,9056

Compared to the initial state at 160°C until 30-35 minutes the intensity of the color change is similar at all investigated species. After 1 hour treatment the cherry and the maple showed the greatest change but the cherry's rate of changing became more intense at the end of the treatment. The ash has the lowest change despite it's bright hue.

At 200°C heat treatment – similarly to the 160°C - the color change become more intense after 30-35 minutes, but the oak and ash has the highest rate. Changes in the beech is the most balanced, but the final value is significantly lower than other species'.



The heat treatment of the veneer quickly and easily enforced because of the geometrical dimensions because it can easily reach the medium temperature in a relatively short period and over the entire cross-section. So the change (hemicellulose, cellulose, lignin, etc.) can be done over the entire cross-section soon. This easily feasible technology is able to the increase the worth of the lower-value wood products.

We demonstrated by our measurements that below 120°C only for the human eye can barely noticeable color change can be reach with 1 hour period. This change can be seen in the case of the oak and maple samples, barely detectable in other species.

At 160 and 200°C, in general, the color-stimulus difference is visible (3 <) or large (6 <) as the treatment period increases. The two treatment temperature caused the most intense change by different species. The oak has the lowest color change at 160°C, but at higher temperature has the biggest. For this two temperature, in case of all species the change of color-stimulus have relation to the treatment period (correlation coefficient higher than 0.9).

