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The change of veneer thickness after pressing - compression

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Abstract: *The change of veneer thickness after pressing – compression.* By wood pressing there are changes of wood measurements, shape and facilities. The target of research was to detect the changes of thickness, to which is coming after veneer pressing in dependence on chosen conditions and parameters of pressing. We also consider the influence of wood moisture, grade of pressing, temperature and time of pressing. There was shown influence of each of mentioned.

Keywords: veneer, pressing, compression molding, climatization, grade of pressing.

INTRODUCTION

The veneer is a basic component used for decorative and construction purpose by creation of different sorts of materials. It subserve a function of basic construction element by plywood and laminated materials or mostly a decorative function by lagging of supporting materials, generally on wood basis. The surface veneers have in both examples important position by product – material quality provision.

In some cases there are adhering to the terms laying on surface veneers also another, e. g. hardness, resistance to the abrasion, smoothness, raising mechanical facilities or others. Higher hardness of natural wood and with that connected facilities can be achieved by pressing.

Pressing is characterized like a process of molding, where the effect of external force is reducing the volume – material substance is concentrating (ZEMIAR et al., 2009). Wood pressing has different modifications; these are individual in wood adjusting before pressing, in direction of effecting force, in way of concluding and other marks (NEMEC et al., 1986, KAFKA et al., 1989). In this fall by veneer pressing we choose pressing in flat press.

Dimensional and shape changes, to which is coming in process of pressing are not permanent (GÁBORÍK, DUDAS 2006). After release of external forces has wood a tendency to return to the primary shape and obtain primary measurements.

In general the purpose of wood pressing is to obtain a dimensional and shape stable product of higher density than is by natural wood.

Dimensional stability is also a base of shape stability. In general the target of research was to discover a dimensional changes, to which is coming by veneer pressing in dependence on selected conditions. The focus of research result from expected application of pressed veneers on the surface of laminar materials.

METHODOLOGY OF WORK

The methodology of work is based on experimental verification of dimensional changes of pressed veneers. We carried out the experiments on shelled beech veneer with thickness 2 mm, area dimension 100 x 100 mm, by two primary moistures – cca 8% and point of fibers satiation (BNV) – average moisture 27,9 %. Pressing progressed in temperatures of

pressing plates 20, 100 and 150 °C, three pressing degrees (20, 35 and 50 %) and time of pressing (time of constant pressure) 2, 8, 15 min, then globally 54 files, at which every file consisted from 10 samples.

We watched the changes of thickness trough scanning – measuring by micrometrical screw in following time intervals 0,5, 1, 4, 24 hours from ending of pressing. At the same time we were detecting by weight method the veneer moisture before and after pressing, after 24 hours of climatization (temperature 20 °C, relative air humidity 65 %).

RESULTS AND DISCUSSION

From the obtained results, because of limited possibilities of publication in extensor, we decide to release only chosen knowledge. We will focus on general characteristic of thickness changes process and special on monitoring of thickness changes in time from releasing of loading until ending of pressing process.

For illustration of thickness changes and defining of their process like an example we will introduce a pressing by following parameters: primary wood moisture approx. 8 %, pressing temperature 100 °C, degree of pressing – 50%, time of pressing 8 min. The process of thickness change is visible on fig. 1 (Note: the time periods on fig. 1 are not illustrated proportional).

For illustration of thickness changes and characterizing their process we introduce pressing by following parameters: primary wood moisture approx 8 ± 1 %, temperature of pressing 100 °C, pressing degree – 50 %, time of pressing 8 min. The process of thickness change is illustrated on fig. 1 (Note: the time periods on fig. 1 are not illustrated proportional).

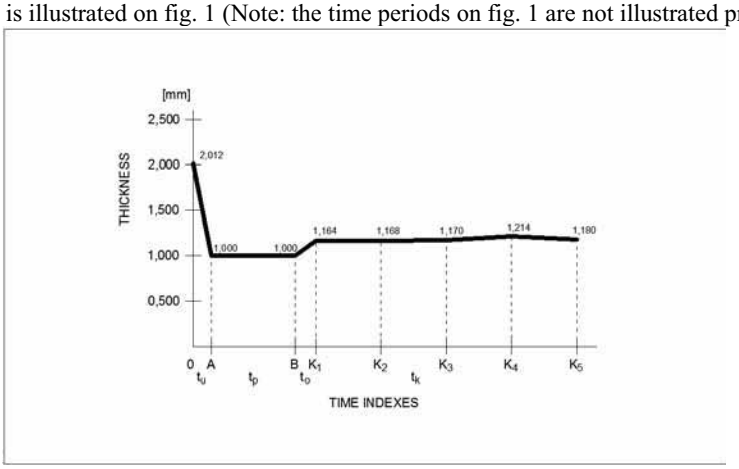

Fig.1 The change of veneer thickness during pressing and climatization by parameters mentioned in text

Following the analysis of obtained graph, as well as another graphs chronicling the process of thickness change by other conditions of pressing process, it is possible to state, that the process of thickness change in all cases is basically similar. In the phase of press clamping (O-A, time section t_u) is the veneer thickness on the decrease on asked level, during pressure holding (A-B, t_p) we are not recording the thickness change, after press opening (B-K_1, t_0) is the thickness generally getting larger and consequently is changing slightly during climatization (K_1-K_5, t_k).

The differences in process of thickness change shows first of all after releasing of the pressure in press (interval B-K_1), where the pressed wood is getting out of loading condition and coming in normal condition. It´s a matter of thickness change, which is consequence of one or two processes, which are passing before unloading. If pressing is happening by temperature of pressing plates 20 °C, the change of thickness after releasing of pressure is a consequence of reaction to elicited elastic deformations, which has shown in this time interval. If pressing is helding by higher temperature of pressing plates, in our case by 100 °C or 150 °C, than during pressing it is coming to drying of wood, and therefore to reduction of its measurements.

The wood thickness during pressing is changing (reducing) following its compression and drying up, and after releasing of power is expanding in consequence of reaction on elicited elastic deformations during loading (pressing), whereby it expense the influence of drying up of wood. Both mentioned events are affecting on the change of size (thickness) in opposite direction. Drying up is reducing it, cushioning is expanding it. On the ground of this fact the material can come to a condition, where the influence of drying is more markedly than influence of reaction (cushioning) on elicited elastic deformations during pressing. This event can be present especially then, when the primary wood moisture is enough high – higher than balanced moisture relative to parameters of pressing process and surrounding environs and drying up during pressing is clear (by high temperature and longer time of pressing).

The consequence of existent events is then a fact, that the veneer thickness after pressing can be smaller than thickness, on which was in process o pressing the veneer pressed.

For the detail analysis of thickness changes in phase after releasing of pressing power are we from reached results presenting like an example pressing in time 15 min., with the wood moisture 8 % and BNV by all other chosen factors, that means pressing degrees – 20% (fig. 2), 35% (fig. 3) and 50% (fig. 4) and temperatures 20, 100, 150 °C.

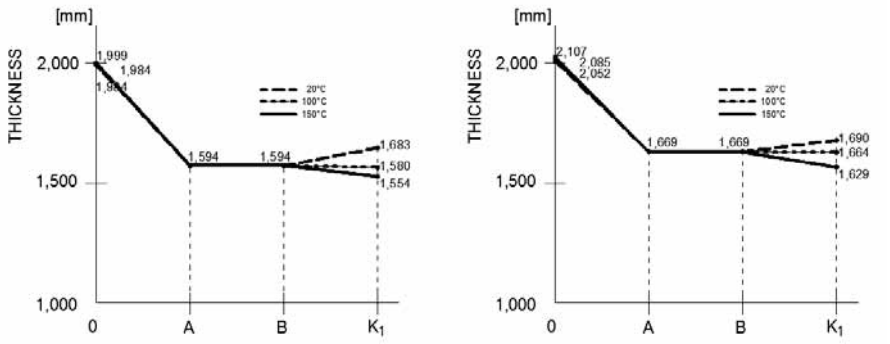

Fig. 2 The change of veneer thickness during pressing by 20% pressing degree
a) by wood moisture 8 % b) by wood moisture BNV

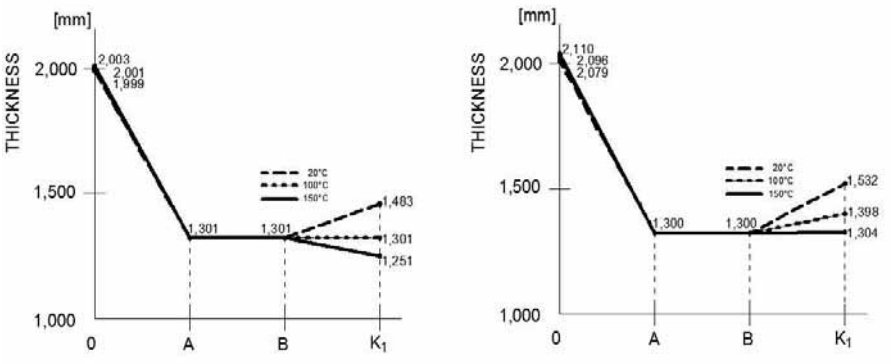

Fig. 3 The change of veneer thickness during pressing by 35% degree of pressing
a) by wood moisture 8 % b) by wood moisture BNV

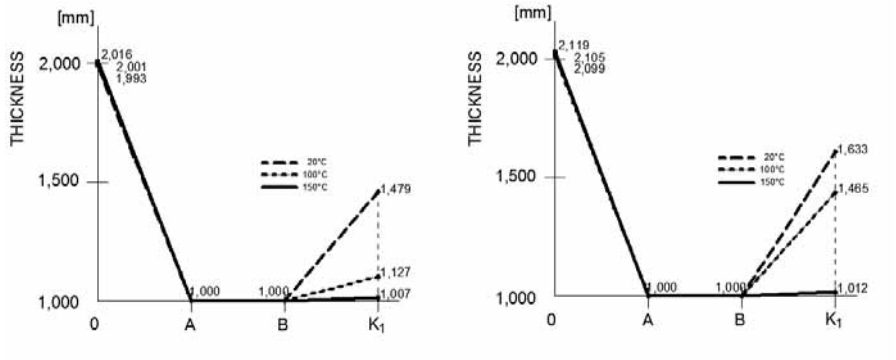

Fig. 4 The change of veneer thickness during pressing by 50% degree of pressing
a) by wood moisture 8 % b) by wood moisture BNV

From the results and presented figures results, that after releasing of loading is the veneer thickness in comparison with veneer thickness in press by existent degree of pressing changing follow:

- by higher primary wood moisture (BNV) are average deviations in veneer thickness after releasing of loading major than by lower moisture (8%),
- with raising of pressing temperature (aside from primary wood moisture) is the deviation between veneer thickness in pres and thickness after releasing of loading growing less,
- with raising of pressing degree the deviations between veneer thickness in press and thickness after loading are increasing.

For an ideal, in terms of thickness changes, we can consider the condition, when there is not coming to any change of thickness after releasing of loading, that means when $\Delta h = 0$. This is possible if wrought material is ideal plastic or, if the change of thickness in consequence of suspension after releasing of loading is identical like the change in consequence of wood drying up, parallel during pressing and unloading. The first possibility of solution is for real

materials not executable, the second one is practically possible, but intricately realizable. Following mentioned it is necessary to count with certain dimensional deviations.

Analogous like thickness changes in phase of releasing loading we can analyze the thickness changes during climatization (sector K1-K5). In generally in this stage it is coming to small dimensional changes, and that either to increase or reduction of thickness (PETRÍK 2010). Thickness changes during climatization, besides pressing degree, dependence especially on moisture of wood after ending of pressing process.

CONCLUSION

By wood pressing there is change of its measurements, shape and physic-mechanical facilities. To dimensional changes and with that connected other changes are coming as during pressing, as after releasing of compressive force. The research showed that by thin wood material – veneer and mechanical or thermo-mechanical way of pressing it is possible by specific pressing degree to affect the veneer thickness by change of wood moisture, temperature and pressing time.

By research obtained cognitions in given area provides the basic information for creation of optimal pressing technology.

LITERATURE

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Streszczenie: *Zmiana grubości forniru po prasowaniu*. W trakcie prasowania drewno zmienia swoje wymiary, kształt i właściwości. Celem pracy było zbadanie zmian grubości spowodowanych prasowaniem w wybranych warunkach i przy zadanych parametrach. Uwzględniono wpływ wilgotności drewna, prędkości prasowania, temperatury oraz czasu prasowania, wykazano wpływ każdego z wymienionych czynników.

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