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EXPERIMENTAL VERIFICATION OF CALCULATING THE LENGTH OF DIFFERENT lumber drying wood

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To improve the technology of the drying process, conducted testing in an industrial environment refined method of calculating its duration for pyloproduktsiyi with oak, pine and alder.

Timber, the drying process, the calculation of the duration, specified method.

During drying, as well as to determine the performance and for the account of drying chambers is important to be able to rely term process. In the drying influenced by several factors: breed material; its size and destination; moisture, which must be removed and the structure of the drying chamber.

There are two basic methods of drying duration pyloproduktsiyi: tabular and graphic-analytical. Graphic-analytical method gives very accurate results, but the main disadvantage is the high complexity that makes it difficult to use in a production environment. This method is mainly used for research purposes. For production environments in MLTI [1] developed a generalized method for calculating the length of drying is based on a calculation formulas are a product of the initial duration of drying Amendment factors that take into account the impact of various factors. Both of these methods have been derived from the approximate solution of equation volohoprovidnosti. They enjoyed many years, and received quite accurate results, until such time as the wood industry have been some changes. Namely, in connection with the production sosoblyvostyamy was stopped using drying cameo boilers, and the transition to water heaters that cheaper process. This technology has changed somewhat drying kinetics pyloproduktsiyi in convective cells, namely, the initial heating at high temperatures, which was sold in the "steam" cells has now become impossible. In addressing this issue was devoted to the work [2], where the kinetics of drying in convective drying chambers with hot water coolant and the new equation that includes the introduction of an additional source of moisture in the famous equation volohoprovidnosti. This made it possible to clarify the calculation of the duration of the drying process to "water"

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cameras. Specifically, solving it with respect to time, we can calculate the drying. A more detailed description of the method presented in [3].

But the proposed method of calculation has the same drawback as semigraphical - requires a large expenditure of time and most importantly, is impossible without the use of specialized computer software that makes it difficult to use in a production environment. Therefore, it was necessary to conduct research for finding simple and generalized method of calculating the length of drying pyloproduktsiyi modern convection "water" cells, which could easily be used in industrial environments.

The purpose of research technology is to improve the drying process by testing in experimental conditions adjusted calculation duration.

Methods of research. Was based on an existing tabular method of calculating the length of drying [1]. Due to changes in coolant drying kilns, there was some adjustment modes drying. The temperature in the chamber gradually increases, respectively, and the material is heated slowly. Also, in recent years, increased competition in the market of wood products, leading to higher quality requirements vysushuvanoyi products. This required a refinement factor that takes into account the category of the drying.

It was also identified the need to clarify the factor, which covered the initial and final moisture pyloproduktsiyi. This ratio existing in tabular method of calculating the length of drying into account only the average values of the initial and final moisture and do not take into account the uneven distribution of moisture in the party primary timber that with a gradual increase in temperature in the chamber at the beginning of the process had a significant impact on the drying.

The last factor, the impact of which is not reflected in the existing tabular method of calculating the length of drying - the drying chamber design. In tabular method takes into account only the impact velocity of circulation of the drying agent; shows that the process is extended with reduced velocity of circulation. But the drying has a significant impact uniformity distribution of aerodynamic field in the chamber. In [4] noted that the extension process that causes uneven drying is about 20-30% of its length. Accordingly, it requires input factor, which would take into account the impact of uneven distribution of aerodynamic field in the chamber for drying in the calculations.

Results. To address these shortcomings proposed revised equation for drying pyloproduktsiyi modern convection cells:

$$\tau = \tau_{вих} \times A_р \times A_ц \times A_в \times A_я \times A_д \times A_{н.р} \quad (1)$$

where $\tau_{вих}$ - Initial duration of drying lumber species and sizes given normal mode of initial moisture content of 60% to a final 12% in the cells with reverse circulation drying agent medium intensity with an estimated speed of drying agent on a material 1 m / s;

$A_р$ - Coefficient category mode of drying .;

$A_ц$ - Factor for the intensity of circulation drying agent;

$A_в$ - Coefficient taking into account the initial and final moisture content;

$A_я$ - Factor for the quality vysushuvanoho material;

$A_д$ - Factor for the length vysushuvanoho material;

$A_{н.р}$ - Factor for the uneven distribution of aerodynamic field in the dryer and variance initial moisture content of lumber in the party.

Based on large-scale experiments in a production environment found that for modes used in modern cells koefitsyent categories regime should be increased from 1.7 to 2.5.

The value of the coefficient $A_{н.р}$ shown in Table. 1.

1. The coefficient $A_{н.р}$.

d_{Wn} %	coefficient of variation of speed air circulation in the stacks Vv %				
	≤25	26 ... 35	36 ... 50	51 ... 70	≥71
≤30	1	1.07	1,105	1.2	1.3
≥31	1.2	1.29	1.425	1.52	1.6

For low variance initial moisture content (d_{Wn} ≤30) koefitsyent $A_{н.р}$ ranges from 1 to 1.3, depending on the coefficient of variation of speed air circulation in the stacks, and accordingly, in the range of 1.2 to 1.6 for high dispersion (d_{Wn} ≥31).

To test this method of calculating the length of drying a series of experimental studies in an industrial environment for three types of wood are often used in carpentry and construction and furniture production: oak, pine and alder. Conditions of the experiments are presented in Table. 2.

2. Conditions of the experiments.

Number dos Lida	Initial moisture content, W_n %	The final moisture $W_к$ %	Dispersion initial moisture content, d_{Wn} %	The speed of circulation, v , M / s	Coeff. variations in the speed of circulation, Vv %	Category Quality
Oak, thickness 30 mm, Research №1 - camera "Katres", research №2 - camera "Luka"						
1	18.7	7.5	23.48	1.0	34.62	II
2	45.4	8.4	19,38	1.76	79.33	II

Pine, thickness 30 mm, Research №1, research №3 - camera "Copcal", research №2 - camera "Nardi"						
1	34.2	9.0	> 100%	0.47	72	II
2	36.8	8.0	> 100%	0.41	25.5	II
3	34.2	4.8	37	0.81	44.5	II
Alder, thickness 30 mm, Research №1, research №2, research №4 - camera "Copcal", Research №3 - camera "Nardi", research №5 - camera "Termolegno"						
1	41	9.3	46.67	0.81	44.5	II
2	39.1	7.9	83.3	0.81	44.5	II
3	25	7.6	23.87	0.41	25.5	II
4	30	9	63.28	0.81	44.5	II
5	31.75	8.7	27.13	0.85	31	II

The results of calculations for timber 30 mm thick oak, pine and alder are shown in Fig. 1 - 3.

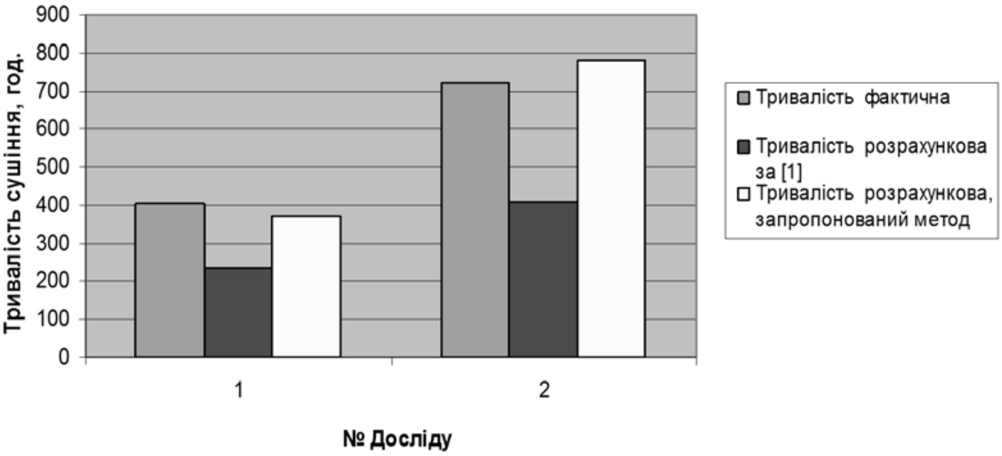

Fig. 1. Drying oak lumber.

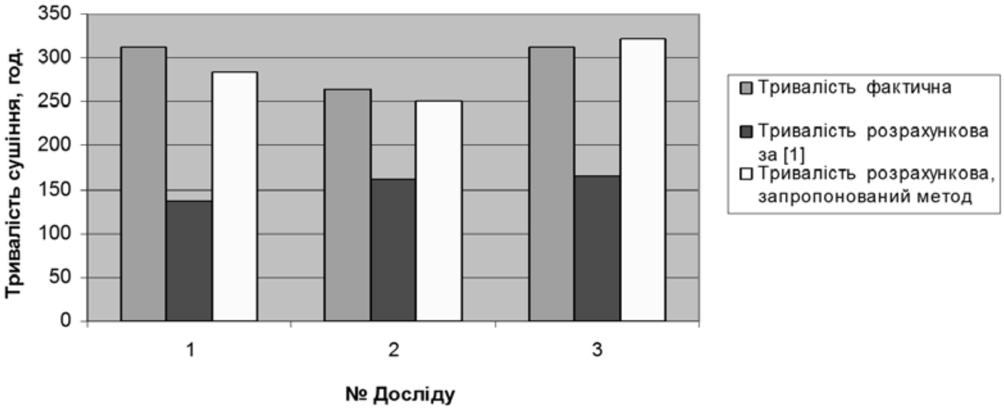

Fig. 2. Drying of pine lumber.

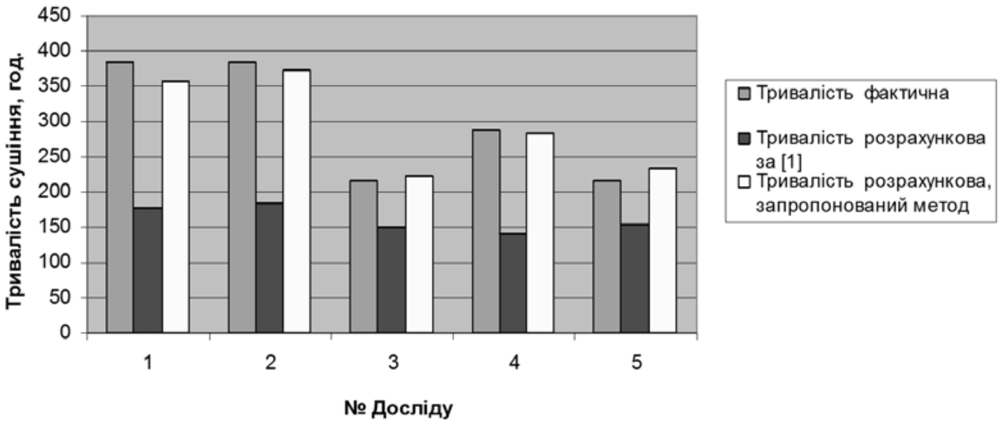

Fig. 3. Drying lumber, wood alder.

As shown in Fig. 1-3 equation for drying lumber proposed method gives much more accurate results than the old tabular, namely, the proposed method estimates differ from actual vserednmu 6%, while the value obtained by the old method - by 44%.

Conclusions

1. The proposed method of calculating the length of lumber drying makes it possible to more accurately determine the time for modern process of convective cells.
2. Using this method can obtain a Performance drying chambers during their design that will not result in artificially inflating process for their operation.
3. Using the proposed method of calculating the duration of the process will make it possible to specify the technology of low-temperature drying pyloproduktsiyi and thus get dried pyloproduktsiyu required level of quality.

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For usovershenstvovanyya technology process drying aprobatsyyu conducted in terms of industrial refinement method for calculating durations ego pyloproduktsyy timber oak sosnы and olhy.

Pylomateryalы, drying process, calculation durations, utochnennыy method.

A pilot-scale approbation of the specified method calculation of drying term is conducted for oak, pine-tree and alder saw-timbers.

Saw-timbers, drying process, duration calculation, specified method.

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MODYFYKATSYYA POLYKONDENSATSYONNЫH GLUE ACTIVATED IN ЭLEKTROMAHNYTNOM MICROWAVE FIELD MONTMORYLLONYTOM

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Proposals for the way they modyfykatsyy karbamydoformaldehydnыh resin with a view Reduction эmyssyy formaldehyda myneralnыm sorbent montmoryllonytom, activated in эlektromahnytnom microwave field, opredelenы optymalnoe TIME and эlektromahnytnoho-power microwave field for aktyvatsyy alyumosylykatnoho sorbent.

Montmoryllonyt, karbamidoformaldegidnaja resin эlektromahnytnoe microwave field, aktyvatsyya, modifier.

C kazhdыm hodom Production of synthetic resins grows kleenыh of products and timber. Each year tempы sostavljajut production growth of 5-11%. Yes, planyruemoe Production of fanerы vozrastet in the world with 71 million. M3 in 2010 to 84 million godu. M3 in 2015, fed, and plates OSB - c 18 million. M3 to 28 million. M3.

When production polykondensatsyonnыh resins DStP, hardboard, MDF and timber of products kleenыh the air a working zone zahryaznyaetsya toksychnыmy compounds. Most toksychnыm and opasnыm compounds in mebelnoy industry javljaetsja formaldehyd. Formaldehyd hazards ymeet class II, then there javljaetsja vыsokoopasnыm substances. Concentration in His Most cases prevыshaet predelnыy Level 5 - 6 times, and pomeschenyyah, where