and strawboards. The main advantages and disadvantages of adhesives based on soy protein have been formed.

Soy protein, wood composites, adhesives

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FOR DRYING TECHNOLOGY round timber

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The results of calculations using mathematical software drying stresses in round timber. We describe a way to control their size.

Round timber technology drying, drying tension control process.

The growing demand for wooden houses require improvement of existing and development of new technologies. More

expensive ekolohobespechnymy the so-called "wild log", ie houses of logs, which contain a natural form and bark is removed manually. The advantages of such structures are evident, the more they resemble authentic wooden buildings. The cost of such buildings is high and is associated not only with the technology of production, but also long-term investment freeze, since the establishment of joinery (windows, doors, etc.), the building is put into operation should allow it to stabilize its size. The process of aging for drying wood lasts 1-3 years after first picking up depending on the size and breed of round timber. So, to avoid this is to develop appropriate drying technology round assortments.

The purpose of research- Development of defect-free drying technology roundwood.

Research Methodology - The traditional approach used to develop defect-free drying on the rational mode woodworking. It calculates the safety criteria by comparing the calculated stresses in drying lumber vysushuvanomu limit tensile strength across the grain [1]. To calculate the stresses in the round assortment we used simulation drying process based on software programming language TurboPascal.

Results. The proposed calculation of internal pressure based on the use of modern computer technology and mathematical software. This enables us to calculate the internal stress on the PC and enables calculation algorithm programmed directly into the microprocessor automation technology that manages the process of drying. To calculate the value of internal stresses in round assortment σr, arising drying wood sample radius r at a distance l from center includes the following values: shrinkage coefficients in the tangential and radial directions kθ, kr, modulus of elasticity in the plain area Eθ, MPa, humidity difference Δ W = (Wts - Wp) between the center and the surface.

Below shown Drying calculation algorithm of stress that can be digital model calculation of internal stresses in the material drying round and implemented on a computer. The procedure for calculation is presented as a series of successive operations:

- Determine the radius r sample distance l from the center, humidity difference ΔW between the center and surface drying coefficient difference (3kθ - kr) and (kθ - kr).
- Definition of functions Y1i, Y2i, Y3i for a radius r and l distance from the center value. It uses three families of functions of m functions in each family:

$$\begin{aligned} &Y_{11} = a_{11} + e^{1-l}; Y_{12} = a_{12} + e^{1-l}; ... Y_{1m} = a_{1m} + e^{1-l} \\ &Y_{21} = a_{21} + e^{1-l}; Y_{22} = a_{22} + e^{1-l}; ... Y_{2m} = a_{2m} + e^{1-l} \\ &Y_{31} = a_{31} + e^{1-l}; Y_{32} = a_{32} + e^{1-l}; ... Y_{3m} = a_{3m} + e^{1-l} \end{aligned} \quad (1)$$

For values of family functions Y1i, Y2i, Y3i constructed two-dimensional arrays of M11 [Li, Ri], M12 [Li, Ri], M13 [Li, Ri], which in the form of two-dimensional matrix shown in Figure 1. Behind them are drop humidity values for all combinations of radii r and l the distance from the center.

M12 [L1, R1] ... M12 [L1, Rm]	M13 [L1, R1] ... M13 [L1, Rm]	M11 [L1, R1] ... M11 [L1, Rm]
... ...	... ...	... ...
M12 [Lm, R1] ... M12 [Lm, Rm]	M13 [Lm, R1] ... M13 [Lm, Rm]	M11 [Lm, R1] ... M11 [Lm, Rm]

Fig. 1. Two-dimensional matrix.

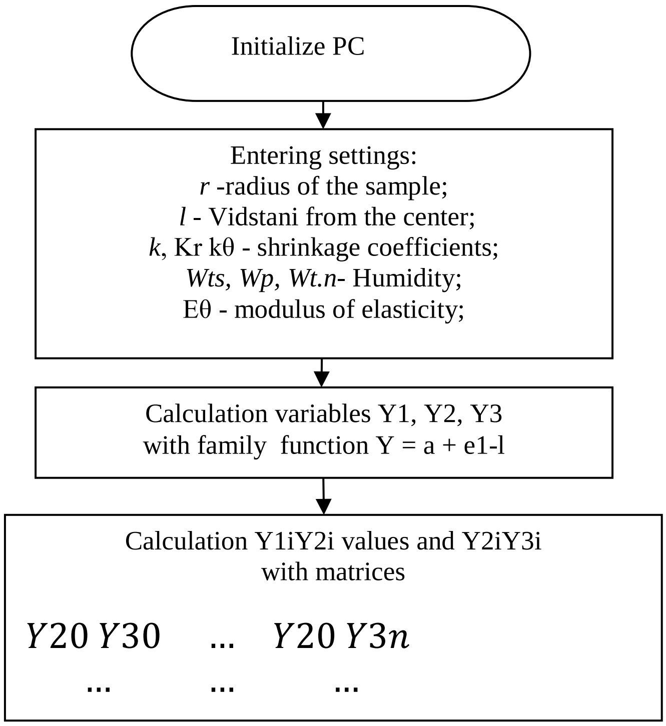
M21 [Y11, Y21, Y31]... M21 [Y11, Y21, Y3m]
... ...
M21 [Y1m, Y21, Y31]... M21 [Y1m, Y21, Y3m]
M21 [Y11, Y21, Y31]... M21 [Y11, Y2m, Y31]
... ...
M21 [Y11, Y2m, Y31]... M21 [Y11, Y2m,

Y3m]
M21 [Y11, Y21, Y31]... M21 [Y1m, Y21, Y31]
... ...
M21 [Y1m, Y21, Y31]... M21 [Y1m, Y2m, Y31]

Fig. 2. The three-dimensional matrix.

- To calculate the deformations that occur under shear and normal stresses determine No value quantities Y1k and Y2k, which find three-dimensional array of M21 [*Y1i, Y2i, Y3i]* (Fig. 2) obtained from family to family functions similar functions (1).
- For values *Y1k*Y2k and using two-dimensional arrays define similarly the dependence of the value functioninternal stresses σr from shrinkage coefficient (3kθ - kr) and (kθ - kr),humidity difference *ΔW* and elastic modulus in the plain area Eθ .

Block diagram of the calculation of internal pressure is shown in Fig. 3.



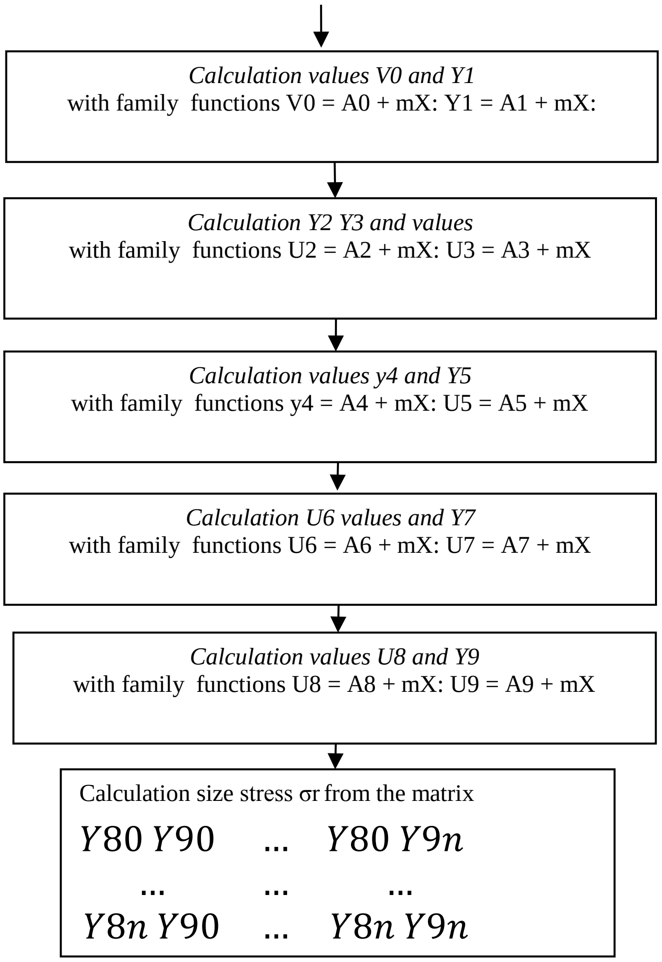


Fig. 3. Block diagram of the calculation of stresses in drying round assortment.

Show on the block diagram calculation values Y0, Y1 ... Y9 conducted similarly calculate values Y1, Y2 Y3, with family type function Y = A + e1-l. The difference - only in the form of families of functions that are represented as linear relationships: Yi = Ai + mX and differ only coefficients A and m. Functions reflect the dependence of the selected distance from the surface where the calculated internal tension coefficient shrinkage, modulus of elasticity in plain direction and humidity difference between the center and the surface.

Fig. 4 shows the interface calculation of internal pressure.

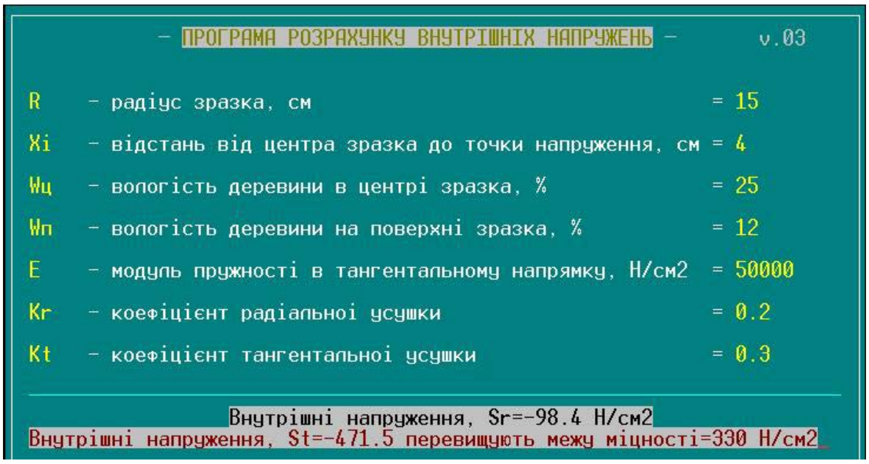
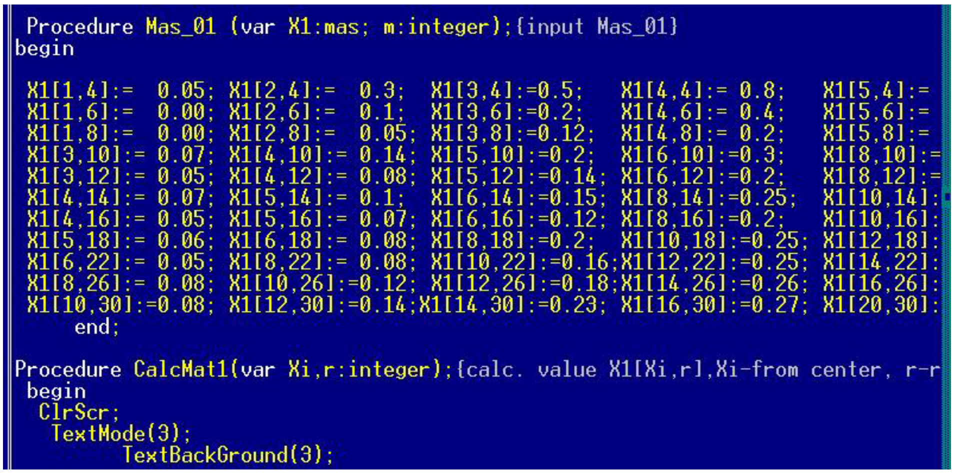


Fig. 4. The program interface calculation of internal pressure.

If the values of the radius of the sample timber moisture in the center and at a distance program can quickly get the predicted value of internal pressure. Fig. Listing 5 shows a fragment program for calculating internal stress written in the programming language TurboPascal.


```
 Procedure Mas_01 (var X1:mas; m:integer);{input Mas_01}
begin
 X1[1,4]:=  0.05; X1[2,4]:=  0.3;  X1[3,4]:=0.5;   X1[4,4]:= 0.8;   X1[5,4]:=
 X1[1,6]:=  0.00; X1[2,6]:=  0.1;  X1[3,6]:=0.2;   X1[4,6]:= 0.4;   X1[5,6]:=
 X1[1,8]:=  0.00; X1[2,8]:=  0.05; X1[3,8]:=0.12;  X1[4,8]:= 0.2;   X1[5,8]:=
 X1[3,10]:= 0.07; X1[4,10]:= 0.14; X1[5,10]:=0.2;  X1[6,10]:=0.3;   X1[8,10]:=
 X1[3,12]:= 0.05; X1[4,12]:= 0.08; X1[5,12]:=0.14; X1[6,12]:=0.2;   X1[8,12]:=
 X1[4,14]:= 0.07; X1[5,14]:= 0.1;  X1[6,14]:=0.15; X1[8,14]:=0.25;  X1[10,14]:
 X1[4,16]:= 0.05; X1[5,16]:= 0.07; X1[6,16]:=0.12; X1[8,16]:=0.2;   X1[10,16]:
 X1[5,18]:= 0.06; X1[6,18]:= 0.08; X1[8,18]:=0.2;  X1[10,18]:=0.25; X1[12,18]:
 X1[6,22]:= 0.05; X1[8,22]:= 0.08; X1[10,22]:=0.16;X1[12,22]:=0.25; X1[14,22]:
 X1[8,26]:= 0.08; X1[10,26]:=0.12; X1[12,26]:=0.18;X1[14,26]:=0.26; X1[16,26]:
 X1[10,30]:=0.08; X1[12,30]:=0.14;X1[14,30]:=0.23; X1[16,30]:=0.27; X1[20,30]:
     end;

Procedure CalcMat1(var Xi,r:integer);{calc. value X1[Xi,r],Xi-from center, r-r
 begin
  ClrScr;
   TextMode(3);
         TextBackGround(3);
```
Fig. 5. Detail listing program for calculating internal stress.

Example of calculations depending internal stresses σr and σθ the distance from the center point of tension specimen shown in Fig. 6.

Fig. 6. Dependence (σr = f (xi), σt = f (xi)) internal stresses σr and σt the distance xi from the center point of tension wood sample (at fixed: Wts = 15 cm = 12 cm Wp; Er = 50000 H / cm2; kr = 0,2; kθ = 0,3).

The gradient of moisture at the intersection of material indirectly reflects internal stresses in the material during drying, so monitoring internal tension wood during its drying can be carried by measuring humidity. To obtain information about the humidity difference ΔW for the lumber section simultaneously connect two moisture: one on the surface, the second - in the center of the sample is dried.

According to information received value ΔW can judge the tension developing in the wood: the higher the humidity difference between surface and central layers, the safer is the magnitude of stresses in the outer layer of the assortment. At the same time the central layer of moisture will display the current humidity assortment.

Initially dry surface layer material quickly reaches equilibrium moisture content and temperature of the surface layer approximately equal to the temperature of the drying agent. Thus, by measuring the moisture ΔW two: the first set on the surface of the assortment and the second set into the center assortment, you can adjust the vertical humidity, thus ensuring the optimization process considering the stress arising from the removal of moisture from the material.

Fig. 7 shows the block diagram of the proposed method the authors of control and regulation of the drying process logs using continuous control humidity of wood on the surface and in the center of the assortment.

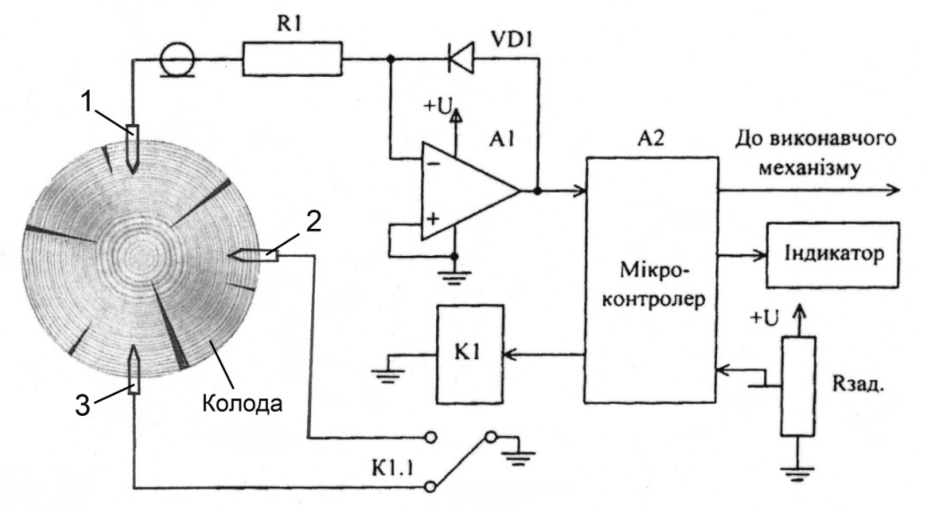


Fig. 7. Block diagram of the method of control and regulation of dry logs.

Drying timber is as follows. On deck set electrodes 1, 2 and 3. 1 electrode connected to the input of the measuring circuit of logarithmic amplifier as A1. Electrodes 2 and 3 alternately connecting through the switch K1.1 of common wire ("earth") measuring system. When connected via a switch electrode 2 K.1.1 the general wire ("ground"), the electrode 1 we obtain electrical signals proportional to the moisture content of the upper layer timber. Similarly, connecting to the common electrode 3 wire circuit, we obtain the electrode 1 electrical signals proportional to the moisture timber cross section. The difference signal used to operate the regime timber. In excess moisture above the permissible difference in the technological regime, reduce the temperature of the drying agent or increasing its moisture content.

To automate the process of drying permissible difference signals set setpoint Rzad. for the performance indicator connected to the microcontroller A2. The signals from the output of the measuring system A1 serves the input of a microcontroller that gives control signals to relay K1 to switch electrodes 2 and 3 contacts K1.1 and control signals on power humidifier and heater dryer drying agent.

The adjustment process by moisturizing dry timber or termination of heat in the drying process by using the proposed method will prevent cracking of wood and lead technological process as rapidly drying at high quality.

Conclusions

1. A method of calculation and control of internal stresses in round timber that allows research the effect of different drying methods and modes for carrying out the process of defect-free.

2. A method of measuring the internal stresses in round assortments for drying, which makes it possible to adjust the process to stresses which will ensure its quality and of shorter duration.

References

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Pryvedenы Results Using calculations with matematy-iCal Provision of software sushylnыh tense in kruhlыh lesomateryalah. Described how to control velychynы s.

Round lesomateryalы, TECHNOLOGY drying sushylnыe voltage control process.

The results of drying stresses calculations with the use of mathematical software in round timber are given. Way to control them is described.

Round timbers, drying technology, drying stresses, process control.

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ANALYSIS OF THE DRYING PROCESS OAK PIECES THE COMPANY LLC "YURA LAMBERT»

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The results of research quality dry oak blanks in convection dryer. Revealed violations technologies that have led to poor quality and lower productivity drying chambers.

Oak blanks, convection dryers, drying quality.

Dry woodis highly durable, resistant to decay processes are well glued, easy to work better. Any timber, regardless of breed, is always affected by changes in humidity and environment through such property it can be attributed to shortcomings. For the manufacture of certain products of wood raw material - pyloproduktsi. It should be dried to the moisture, which meets the requirements of the products from it.

Enterprise LLC "Yura Lambert" specializes in drying oak pieces to be used in joinery and furniture manufacturing. Therefore, they should be dried for category II as drying to the final moisture content Wk = 8%. Therefore, the process of drying oak pieces need to follow, to determine the quality of drying, dry as dust products are exported to Europe, at very stringent requirements.

The purpose of research - Identify factors that improve productivity and quality camera dry oak pieces.

Material and methods of research - research for drying was used as the main provisionsISO 4921: 2008 "Pyloproduktsiya. Quality Evaluation drying "[1].

Research uniformity circulation drying agent in the material held by the methodology of Technical Guidance materials from lumber drying chamber technology [2].

Studies were conducted using vysushuvanoho material thickness blanks enterprise -dubovyh 27 mm.

Results. The process of drying Ltd. "Yura Lambert" is organized as follows: first pidsushuyutsya packages blanks on the area of atmospheric