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THE PECULARYTIES OF OAK TIMBER BLANK DRYING

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The results of oak stocks drying quality investigations in the industrial conditions are given. It had helped to estimate the negative results oak drying process

Oak wood, stocks, drying defects, drying quality

The task of drying is to achieve the best quality of saw timbers with new moisture content. Drying quality assessment by visual method and assess by absence of cracks. Understanding of technologies drying tasks help to choose economic and effective drying method to achieve best quality material. It helps drying operators and manager's orient in specific situations connect with the initial material parameters and realize optimal regimes in kiln.

The purpose of the research – to discover the peculiarities of oak timber blank drying for prevention of negative results.

Methods of researches. Were done the experimental dryings of oak timber blanks in different kilns – Luka, made by polish firm and Katres, made by czech firm. These kilns are situated on two different enterprises – Novograd-Volynske DLMG and LTD "Yuro-Lamber" accordingly. Both kilns has the same construction, in witch realized vertical–across air circulation; air heating is made by using hot water heaters with temperature t=90°C, witch guarantee low temperature drying regimes; heaters are in aerodynamic channel at one level with false ceiling and at one side of timber stock. Kilns have different quantity of heaters, fans witch depends from timber stocks volume.

According to recommends [1] on the both enterprises were done tree experimental dryings. In chamber Luka was dried 130 $м^3$ oak timber blanks 28x90x1200 mm in size from the initial moisture W_i=40% to final W_f=8% by the II level drying quality. In chamber Katres also was dried 120 $м^3$ oak timber

blanks by the same level drying quality 27x100x2000 mm in size from the initial moisture W_i=45% to final W_f=8%.

Drying quality was assessment according to the methodic DSTU 4921:2008 [2]. For moisture content estimate were used electric-resistance moisture meters: HT 85 T (firm GANN, Germany) with the error ±0,5% and "Brykohyis" (Netherland) with the error ±1,0 %.

Results. Dry shops on these enterprises have different organization. There are structures of the air drying on the LTD "Yuro-Lamber", without side walls but with ceilings and end walls, witch have holes 5 vv in diameter for best air circulation. Along stock sizes under ceiling there are sprinklers for water irrigation to rise air humidity if winds and temperature are force. Dried oak timber blanks to average moisture content *W≤30%* storage in convectional chambers Katres for drying to final moisture.

Technology witch use in enterprise helps to low drying cost by the energy expenses economy and guarantee need level drying quality as facts by the experiments – table.1 (Chamber 1). Yet wishing energy expenses economy by the offing half of fans lead to uneven stocks heating and lowing drying quality – table.1 (Chamber 2).

Table 1. Results of quality dry oak timber blanks due to II level dry quality according to moisture indexes

Indexes	Chamber 1				Chamber 2			
	Stock 1	Stock 2	Stock 3	Stock 4	Stock 1	Stock 2	Stock 3	Stock 4
Average speed air circulation in chamber, m/s	1,01				0,25			
Coefficient speed air circulation variation in chamber, %	34,6				77,3			
Average indexes drying quality:								
Need final moisture content oak timber blanks, $W_{av.f.}$,%	8	8	8	8	8	8	8	8
Actual final moisture content oak timber blanks, $W_{av.f.,ac.}$%	7,9	7,7	7,2	7,3	8,5	8,6	9,4	9,1
Quantity units timber blanks, witch don't correspond normal index due to index ΔW for II level dry quality (ΔW=±1,5%),units	1	2	-	1	3	1	18	15
Final unit timber blanks moisture	1,45	1,32	1,35	1,44	1,44	1,16	1,41	1,43

content deviation from need moisture content, $\pm 2\sigma_{W.f}$,%

In spite of our experiments, witch confirm possibility to achieve II level dry quality oak timber blanks in Katres chambers, nonconformity technology breaking lead to no quality drying and it's wrong. These lead to appearance of bright stains in the middle of blanks witch spoil lamel surface make by deep cutting.

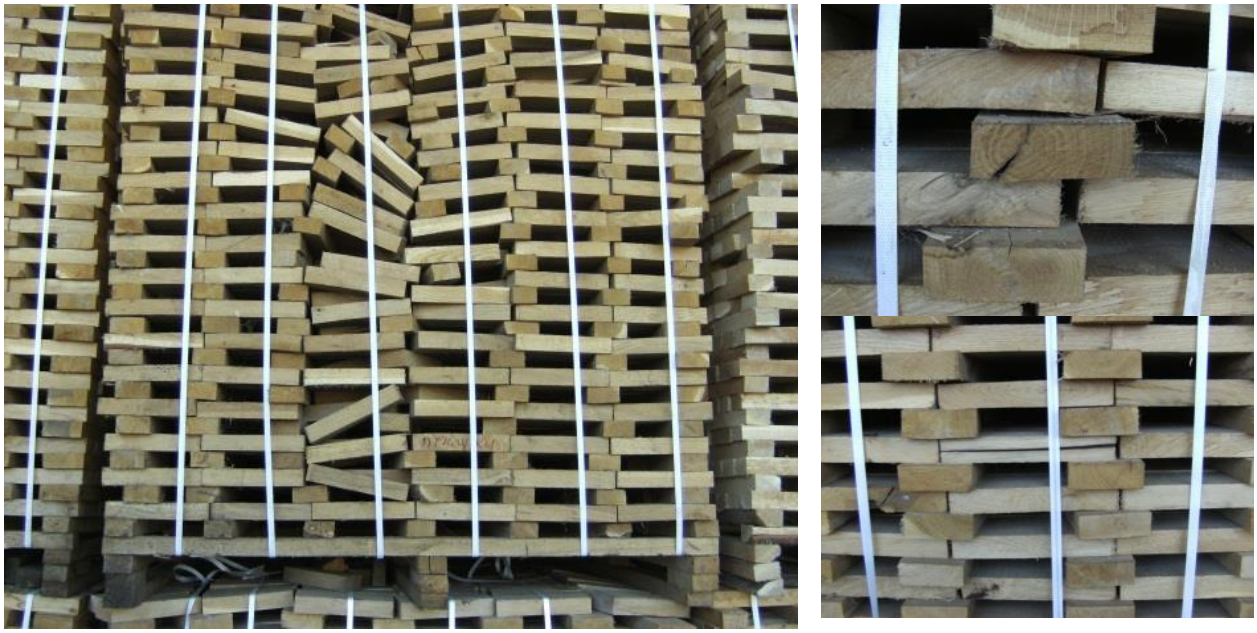
The investigation of these drying defect shown that it occurred on the beginning of process as the result of longest drying by regimes with low temperatures and high humidity [3,4]. For prevent these defect there are never correct regime to lower air temperature from 70°C to 55°C. Timber blanks came to chamber after air drying and have moisture content W <30%, therefore influence high temperatures on there physics and mechanic properties isn't bad and cutting down drying time also prime cost.

The analysis of oak timber blanks drying quality also confirms possibility to achieve II level dry quality in Luka chambers. However there were a lot of breaking stocks forming, witch lead to drying defects (fig.1), in spite of operates didn't correct regimes. One else negative factor connects with high timber blanks initial moisture content dispersion (tabl.2). Therefore in the enterprise raise drying time and have high prime cost.

Table 2.Oak timber blanks moisture content indexes

N of chamber	Average initial moisture content, $W_{av.i..}$, %	Initial moisture content dispertion d_i, %%	Average final moisture content $W_{av.f..}$, %	Final unit timber blanks moisture content deviation from need moisture content, $\pm 2\sigma_{W.f}$,%
№4	40,52	114,5	7,92	±2,07
№6	40,64	103,84	8,48	±1,20

For lower energy spending, initial moisture content dispersion and twice lowering time drying enterprise must organized department of oak timber blanks air drying. .



a **b**

Fig. 1. Wrong stock storage (a) and drying defects (b)

Calculation of square of oak timber blanks air drying department shown that for these purpose needs only 1000 m^2 square to supply year volume. Therefore oak timber blanks prime cost would be 108 grn/m^3 and would rise the probability need drying quality.

Conclusions

1. Investigation of oak timber blanks drying quality in convective chambers at enterprises conditions show possibility achievement high drying quality due to keep rational drying technology.

2. Were fixed that for change drying technology given by kiln firm-made could be science confirmed basis. Prevention into traditional process low level qualified workers lead to drying defects, low drying quality and give negative opinion to the production of famous firms.

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Приведены результаты исследования качества сушки дубовых заготовок в производственных условиях, которые позволили определить причины возникновения брака сушки и несоответствующей требованиям категории качества проведения процесса

Древесина дуба, заготовки, брак сушки, качество сушки.