UDC 674.09: 674,093

OPTIMIZATION OF TIMBER cutting TAKING INTO ACCOUNT-dimensional quality characteristics

VS Koval, Ph.D.
SM Mazurchuk, applicant

Analyzed previous studies on timber cutting process workpiece size-based qualitative characteristics in their timber scanning. The possibility of improving the volume and quality output blanks.

Pyloproduktsiya specification, sawing, optimization, defects, boards, cut, cutting plan, useful output

Optimization of technology for cutting lumber piece is one of the effective ways of increasing the output of billets and is a prerequisite for the rational use of wood. Efficacy results sawing lumber on the workpiece depends mainly on the accuracy of the results describe lumber quality, shape and size. Increased output pieces of lumber in the application of the optimized cutting plans from similar data obtained by cutting production in some cases may be more than 10%, indicating the urgency of implementing technology timber cutting into shapes that considers size-qualitative characteristics.

Optimization of the process of cutting timber on planks of wood complicated by the presence of defects and non-uniformity of physical and mechanical properties. Unlike similar problems to be solved for cutting plate materials, timber cutting into shapes characterized by considerable complexity and some difficulties that arise during program implementation of the mathematical description of a raw material.

The main contribution to the development of classical linear methods, non-linear and dynamic programming to optimize the plan

cutting industrial materials into shapes made by such scientists as VA Zalhaller [4] R. Bellman [1,2,10,] LV Kantorovich [5]. Their proposed industrial cutting optimization problem with many common features, but some of their specific features are resolved outside the classical mathematical methods.

A significant contribution in modeling processes algorithmization cutting plans regarding plate wood materials for furniture made blanks MN Feller. In [3, 7-9], which deals with algorithms placing pieces povzdovzh the width of the plate and cutting, drawing attention to the fact that the next version of placing pieces based on previous povzdovzh with some modifications.

Famous works with the modeling and optimization of processes woodworking Pizhurina AA, and Rozenblita MS [6].

Software that enables you to predict volumetric yield pyloproduktsiyi, make a plan cutting material and, if necessary, correct it developed in different programming environments. Most attention is paid to these plans, cutting roundwood. A problem of optimization of cutting pieces of lumber currently paid enough that this is due to the complexity of determining the quality characteristics of size-timber.

The purpose of research - Improve the process of cutting timber on the workpiece.

Material and Methods Research - includes: receiving information about the shape, size and quality of timber, which in subsequent calculations take into account when determining the volumetric output blanks. For information about the material and its flaws received by scanning. Timber and measured dimensions were determined using digital methods of assessment form and the presence of defect sites on the surface. Evaluated two reservoir timber. Information on surface electronically superimposed on one another and cutting boards placed under specification of notch defect sites. Then the actual amount received blanks compared with volumes blanks have been received in the company of the same timber.

Results. Experimental study on timber cutting into shapes on account of their size-quality characteristics. Checking the results dimensionally-quality lumber in their characteristics sprayed onto the workpiece showed that the proportion of detected defect identification seats (knots, cracks, rot) is 95-97% relative to the total number of defective seats, while the share of installed incorrectly - 2%. Fig. 1 shows the use of timber cutting plan into shapes with the previous layout, and laying on a cross-longitudinal pattern in which much better use of null. This method of cutting timber on the workpiece with the previous assessment of the quality of raw materials increased efficiency to 10%.

Fig. 1 shows the experimental cutting of timber on blank sheets are the size of the pre-dimensionally conducted qualitative characteristic. As a result found that when cutting width and the presence of defect sites on the surface of lumber are the main parameters affecting the useful output specification products.

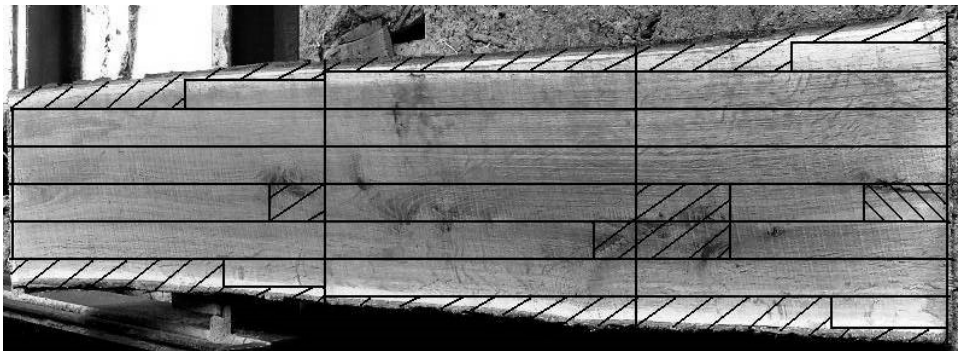

Fig. 1. Plan of timber cutting into shapes.

Experimental data timber cutting and their statistical analysis are shown in Table. 1.

1. Results of cutting timber on the workpiece.

Number of experiment	Grade	Dimensions of timber			Volume of timber, 0-2 m3	Timber size			Amount of pieces, pieces	Volume blanks, 10-2m3	Volume blanks general, 10-2 m3	Useful blanks out, %
		length, m	width, m	thickness, m		length, m	width, m	thickness, m				
1	2	1.730	0.26	0,030	1,349	.522	.087	0,030	6	0,136	.817	60.58
2	2	1.730	0.30	0,030	1.557	.520	0,086	0,030	9	.134	1.207	77.55
3	1	1.730	0.31	0,030	1.609	0.525	.087	0,030	9	0,137	1.233	76.65
99	1	1.725	0.37	0,030	1.915	.520	.087	0,030	11	0,136	1,493	77.97
100	1	1.721	0.30	0,030	1.549	.520	.087	0,030	9	0,136	1,221	78.86
Mean		1.724	.355	0,030		.521	.087	0,030				70.92
Standard deviation												6.47

End Table. 1

The average error	0.65
The coefficient of variation	9.12
Indicator accuracy	0.91
The required number of measurements	22.14

The dependence of the output volume of pieces of timber volume and width are presented in (Fig. 2) and (Fig. 3).

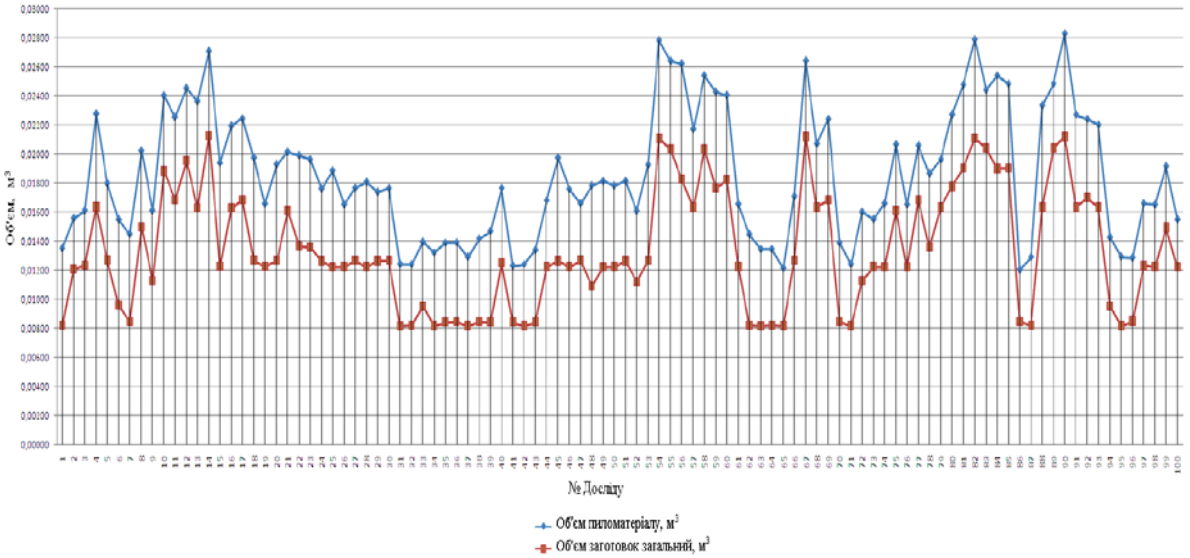

Fig. 2. Dependence of the output volume on the volume of timber blanks.

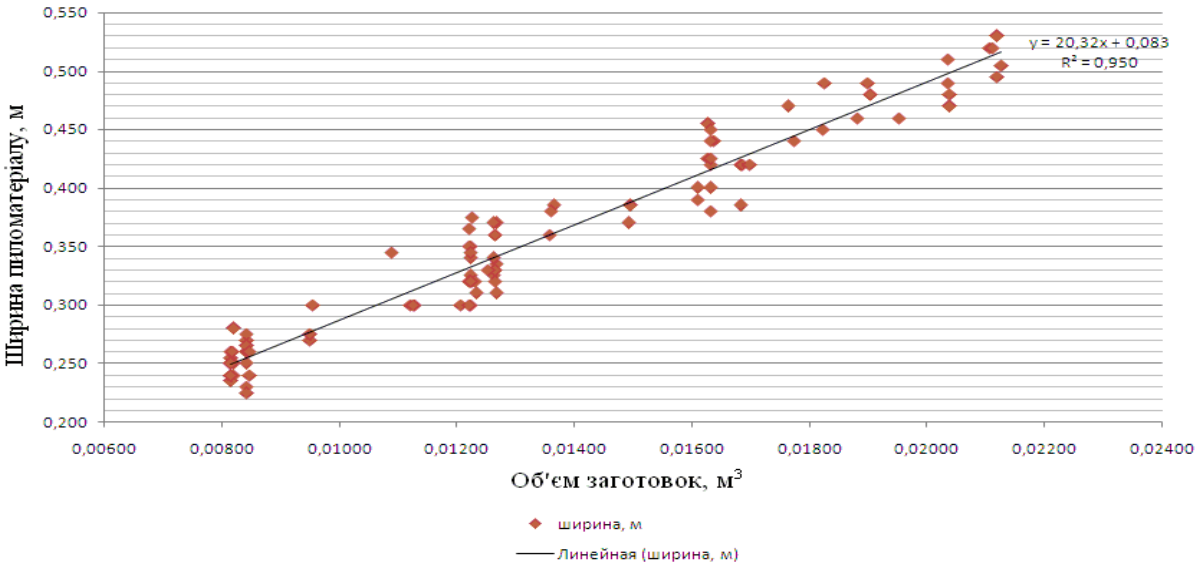

Fig. 3. The dependence of the output volume of pieces of timber width.

In the resulting graph can be noted that the amount received at sawing pieces of timber for each experiment is directly proportional to the volume of timber. The presence of defects on the surface of timber lead to lower output volume of useful pieces.

Fig. 3 can track how the pieces surround output depending on the width of the timber. You can see that the value of the output volume has a linear dependence on the width of the timber, and it increases with the increase. The range of timber widths ranged from 0.220 to 0.530 m.

Conclusions

1. The results of studies on the basis of schemes sawing timber into shapes according to their shape and quality. A method of optimizing the process of cutting timber in view of size-quality characteristics of the workpiece.

2. Experimental research on cutting timber on the workpiece during size-qualitative characteristics before laying witnessed an increase in output volume when compared to production results. Average net volume after cutting out pieces of lumber is 70.92%. The range of output volume pieces range from 56.67 - 83.62%. Size differences range depends on the size of timber and the presence of defects that are in the timber.

3. It is established that application of this method will allow to evaluate the characteristics of timber defects that will further optimize cutting timber on the workpiece.

References

1. R. Bellman Dynamycheskoe programming: Per. with the English. IM Andreeva. AA Korbut et al. / Ed. NN Vorobeva. - M .: Izd forth. lit-гы, 1960. - 391 p.
2. Bellman, R., C. Dreyfuss Prykladnые Dynamic programming tasks / Per. with the English. ed. AA Pervozvanskoho. - M .: Nauka, 1965. - 457 p.
3. Hrytsiuk YI Optimization of the process of plate cutting wood materials for furniture blanks: Monograph / YI Hrytsiuk. - Lviv: Ed. house "Panorama", 2004. - 484 p.
4. Zalhaller VA Rev. single used neobhodymom signs plotneysheho Location of figures / VA Zalhaller // matemat successes. Science. - 1953, № 8.
5. LV Kantorovich Matematycheskye organization and Scheduling methods of production. - L .: LSU, 1939. - 46 c.
6. Pyzhuryn AA, MS Rozenblyt Fundamentals of modeling and optimization processes derevoobrabotky: Training. for high schools. - M .: Lesna. prom-st, 1988. - 296 p.
7. Feller MN, Holovinskyy BL Choosing the best method of cutting sheet materials // Forest wood, paper i d / o prom Amount: Rep. mizhvid. scientific-technical. Coll. - 1966, № 1. - P. 10-12.
8. Feller MN, Kolesnik G., JA Yudytskyy About algorithmization possible schemes calculate cutting sheet materials // Forest wood, paper i d / o prom Amount: Rep. mizhvid. scientific-technical. Coll. - 1969, № 3. - P. 38-39.
9. Feller MN Cutting Optimization lystovыh drevesnыh materials on computers // Derevoobrab. prom-st. - 1970, № 12. - P. 6-8.
10. Bellman R.A. Dynamic programming treatment of the traveling salesman problem. - J.ACM. - 1959. - 9, N 1. - P. 61-63.

Proanalyzyrovanы Studies predvarytelnые processes pylomateryalov Cutting into shapes with uchetom razmerno-kachestvennoy characteristics at pylomateryalov s Scan. Shown to Increase Ability obъemnoho and qualitative Exit blanks.

Spetsyfykatsyonaya pyloproduktsyya, raspylovka, optimization, defekty, pylomateryal, billets, Cutting plan, Useful Out

Analyzed previous studies of processes of cutting timber on the workpiece size-based qualitative characteristics of timber when they crawl. The possibility of increasing volume and quality output blanks.

Specification pyloproduktsiya, cutting, optimization, defects, timber, harvesting, cutting plan, useful output

UDC 674,815: 631,572

DEVELOP RECOMMENDATIONS ON DELIVERY STORAGE AND STRAW FOR THE MANUFACTURE OF PARTICLE BOARD

RO Kozak, Ph.D.
National Forestry University of Ukraine

Analyzed the operation of supply and storage of raw materials for particle board. The main differences from straw woody materials and tasks for the organization of supply and storage of straw. Formed advice straw supply to the plant and its storage in warehouses for the effective organization of the process of manufacturing particle board using a straw.

Straw, supply, storage, particle boards.

Efficiency of particle board is largely dependent on the presence in the region of sufficient raw capacity of its procurement and supply [1].

Storage of wood raw material to the company's warehouses affect the quality and costs of raw materials and as a result, the quality of the finished plates [2].

The process of manufacturing particle board using straw straw provides delivery to the plant and its storage in warehouses. However, because the straw and now that the acute shortage of wood as a raw material is not considered, but only as waste, no recommendations on the straw supply to the plant and its storage in warehouses. Established same manufacturing operations and supply of wood raw material storage can not be applied to straw through significant differences in terms of their preparation, transportation and storage. Therefore, for the