Drevesnыe kompozytsyonnыe materials, drevesnыe fiber monodrev, crushing tonkomernoy timber.

Influence of features of wood component upon properties of wood composite materials is analyzed. Stages of technological process of "monoderev" composite material production are presented. The results of the pilot experiment on production of wood component by crushing low diameter wood are shown.

Wood composite materials, wood fiber, monoderev, crushing of low diameter wood.

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Resource saving TECHNOLOGIES Processing Used WOOD

SV Hyde, Ph.D.
National Forestry University of Ukraine

Used systematic approach to processing VZHD in technology derevoobroblennya. Experimentally confirmed the possibility of using technology in production processes VZHD derevoobroblennya of manufacturing product samples, blanks curved shape, furniture board, carpentry plate. The main physical and mechanical properties of the resulting product developed by technology. Proposed regime parameters for the implementation of the results of research into production. Developed resource saving and ecologically technology with practical recommendations for VZHD in derevoobroblenni.

Used wood, potential, systematic approach,mathematical models derevoobroblennya technology, practical recommendations.

Urgency. Potential resource base and unused raw wood, which reserves increased with the development of industry and economy in general are inventories of used wood (VZHD). Studies of domestic and foreign scholars of this problem related mainly use industrial wood waste, without involving VZHD the process of recycling - making products from it. The results of their study suggest that the problem is not completely solved, having not developed a scientific basis and practical recommendations for efficient production processes to the prediction of properties of the products VZHD.Thus, the study

scientific and technical base, development of resource saving and ecologically technologies to elucidate the use VZHD impact on physical and mechanical properties obtained products, Development of operational parameters and formation of practical recommendations, experimental results are important and urgent problem today.

Problem Research - Lack of resource saving and ecologically technology with practical recommendations on how to use VZHD. A partial solution to this problem will provide alternative field derevoobroblennya additional resources by recycling VZHD in integral form for products: slabs, furniture panels, joiner plate.

The purpose of research - Research opportunities and clarify the characteristics VZHD use of technology derevoobroblennya in a holistic way.

Research object - resource saving technologies VZHD use.

Purpose of the study - Physical and mathematical models and practical recommendations for VZHD in technology derevoobroblennya.

Results.VZHD - is used wood and any wood products generated in the production and human life, as a result of natural disasters that do not have a place for the purpose of further education and subject to processing in order to protect the environment and human health or to re-involve them in economic activity as raw material and energy resources.

By VZHD are remains of household items and packaging materials; residual VZHD all other types of businesses, organizations and the public; remnants of raw materials, intermediate products, etc., formed during production or work, have lost all or part of the weekend and consumer properties damaged or neremontozdatni worked physically worn out products and materials that have lost their properties. VZHD, depending on the degree of contamination may be related to one of the proposed categories: VZHD-I - the natural and only mechanically treated wood with minor contamination with natural ties and wood from natural disasters; VZHD-II - treated wood and wood materials without substance and without wood protection halohenoorhanichnyh relationships in the coatings; VZHD-III - treated wood and wood materials without wood protection substances and halohenoorhanichnymy bonds in the coatings; VZHD-IV - wood and wood materials processed substances protection.

Identification of potential VZHD. Calculation of potential VZHD information is based on the statistics of the State Agency of Ukraine on forest resources for timber in 2012, which was at 12.18 million. Tons (17.4 million. Dense m3) [13]. Studied that in Ukraine every year produced a number VZHD - waste consumption, the proportion of wood which is over 50%. Considering that the consumption of wood depends

on exports and imports, which cancel each other in the overall balance of raw volumes of VZHD calculated on the amount of harvesting (Vs) in an amount of 13% (generally in the EU calculation) that was in 2012. 1.58 million. t. In addition, Ukraine annually in settlements produced an average of 50-60 mln. m3 (VTPV) solid waste (MSW), where the proportion VZHD is 2-4%. According to the Ministry of Regional Development, Construction, Housing and Utilities in 2012 formed 14 million. Tons of solid waste, of which 0.42 million. Tons (3%) VZHD (Table. 1).

1. The potential of wood used in Ukraine.

Origin	Estimated potential used wood					
	2010		2011		2012	
	%	mln. tons.	%	mln. tons.	%	mln. tons.
Trade (containers, pallets)	13,00	.363	12,00	.288	15,00	.301
Building wood wastes	18,00	.503	22.00	.527	23,00	.461
Woodworking	7.00	.196	6.00	.144	6.00	0.120
Old furniture products	12,00	0.335	12,00	.288	13,00	.261
Municipal waste	16,00	.447	16,00	.383	17,00	.341
Municipal solid waste	27,00	.755	24.00	.575	21,00	0,421
Other VZHD	7.00	.196	8.00	.192	5.00	0,100
Total VZHD	100.00	2.795	100.00	2,396	100.0	2.004

Thus, in the Ukraine in 2012 was formed 2 million. VZHD tons, with a power capacity 0.936 million tons EF. (PJ 27.442 or 7.623 billion. KWh). By using the amount of material suitable VZHD may not exceed 80% of the units, ie 1.6 million. T. VZHD processed formed over the allocation of 50% and 30% Kuskova crushed VZHD can significantly reduce the level of procurement of primary raw materials and improve the ecological state in landfills and the environment. The potential number VZHD per inhabitant of Ukraine 45.55 million. People. (2013) is 44 kg. Based on the estimated amount of the cluster approach for the formation VZHD regions of Ukraine (Fig. 1).

Methods for cleaning VZHD. Cleaning VZHD engaged by types in the following ways: internal - mechanical and thermo-chemical methods for VZHD crushed; external - remove existing metal and other objects before and after passing through the metal detector; surface - surface cleaning hand tools and modernized machines. Cleaning equipment includes the following models of machines: holkofrezernyy, brush, grinding, milling, piskostruynyy, special and others.

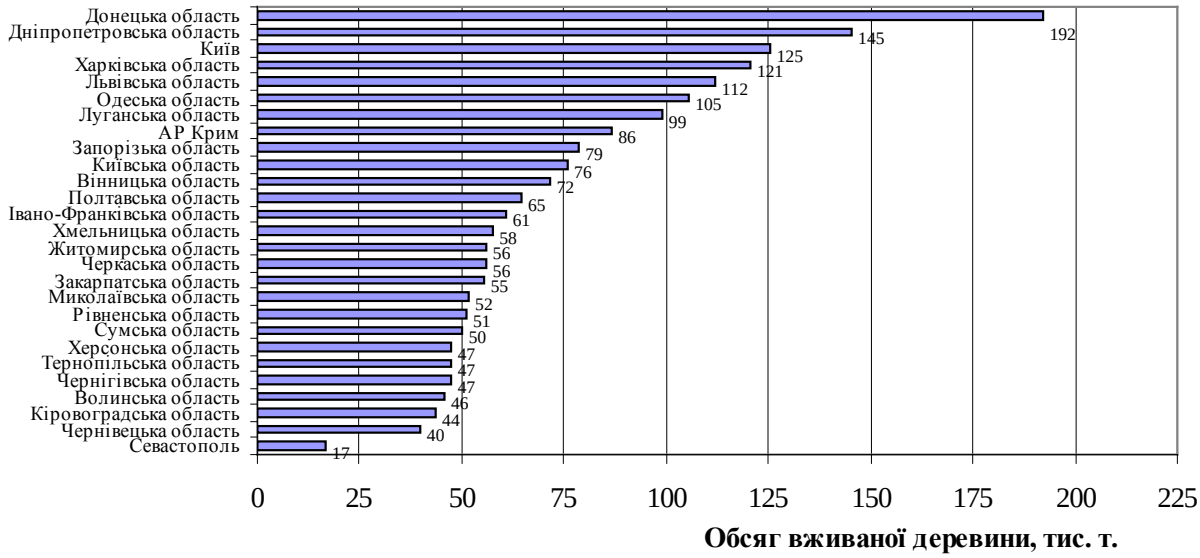

Fig. 1. Cluster approach to monitoring VZHD (2012, ths. Tons).

Features holkofrez as an effective tool for cleaning VZHD. Modern industry produces holkofrezy different types: face, cylindrical roller, with wicker elements and corrugated wire. For wire radial elements can be used metal wire made of carbon or stainless steel with different diameters, Nylon thread and many other materials, and for a given stiffness possible combinations, such as wire and rubber elements.

The actual feature of this tool is its flexible working surface formed many working elements - elastic ends of the wire, allowing the use of a wire tool for surface treatment VZHD.

Much holkofrezernyh surface and brush designs allows several dozen times to increase the surface area of heat transfer, which is used for increasing the heat, and for rapid removal of paint from the surface VZHD. Given the advantages holkofrezernoho tool in the directions of research and the benefits of holkofrez to clean VZHD of surface contaminants: efficient use holkofrezernoho tool for removal of paint and material lychkivok including PVC film in the utilization VZHD - old furniture, woodwork and construction and other products; replacement VZHD planing knife tool in order to get prepared surface material for further use; machining modified, especially wood materials impregnated with high hardness; receiving comb treated surface during processing elastic holkofrezoyu massive VZHD with pronounced early and late zones.

A typical plan workshop for sorting, segregation and treatment VZHD. Developed the standard plan shop size 36 × 24 m, which provides sorting VZHD in four categories according to the type of material - array plate; segregation humidity, unacceptable for inclusion and contamination (Fig. 2).

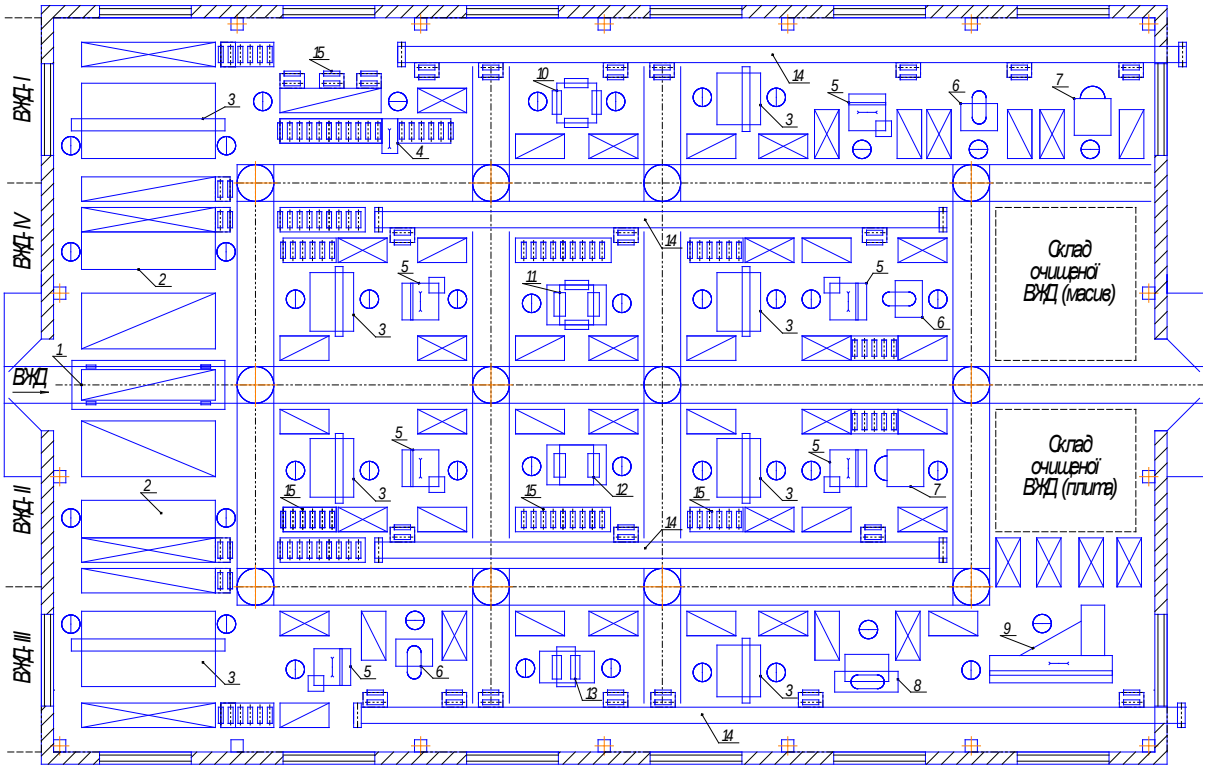

Fig. 2. A typical plan of purification plant VZHD: 1 - traverse trolley, 2 - desktop 3 - Metal 4 - guillotine in t-5 - kruhlopylkovyy in-t 6 - t-strichkopylkovyy in 7 - milling in-t, 8 - kraykoshlifuvalnyy a t-9 - format-cutting in t-10 - Chotyrybichnoshlifuvalnyy in t-11 - chotyrybichnoholkofrezernyy in t-12 - dvobichnoholkofrezernyy in t-13 - dvobichnoshlifuvalnyy a-ton, 14 - line 15 - section roller.

The feature of the shop is delimitation of its four streams. In the first and second processed massive VZHD - under categories: pure VZHD-I and dirty VZHD-IV. The other half spend processing plant plate materials: a third stream - VZHD II; in the fourth stream - VZHD III.

After surface cleaning is carried out repeated detection of metallic inclusions using metal detectors that are in each of the four streams. Defect-free VZHD is suitable for obtaining pieces of secondary machines processing machine. Purified VZHD these stages and recommendations (Table. 3) is more raw materials for the manufacture of joinery boards, furniture board, pieces curved shape and other details.

3. Recommendations to technology sorting and segregation VZHD.

Number	Stages and operations	Equipment
1	Collection, accumulation by type	Places education, economy
2	Bringing to include processing	Vehicles
3	Identification VZHD by Category	Visually, instruments
4	Sort by material breed	Manual automatically
5	Segregation humidity, pollution	Visually, instruments

6	Shown in unacceptable chemicals	Indicator, research
7	Removal of foreign inclusions	Tools physically
8	Remove visible metal	Metal detector, physically
9	Removal of coatings (films)	Machines for cleaning
10	Distribution of Technology	The process of recycling

The methodology and results of research. Matched techniques were implemented multifactor experimental studies to produce adequate physical and mathematical models (Table. 4, 5). Found onakonomirnosti use VZHD impact on physical and mechanical properties of target products.

4. Methodology and model parameters carpentry plate with VZHD.

Methods of implementation B2 plan for carpentry plate with VZHD							
Number	Title	One. meas.	Marking	Interval changes	The level of factor		
					-1	0	+1
1	Glue consumption	g / m2	Q	75	150	225	300
2	The width of the rails	mm	In the	20	20	40	60

Mathematical models of plate joiner VZHD

Static bending strength in the transverse rails MPa:

End Table. 4

Methods of implementation B2 plan for carpentry plate with VZHD					
Number	Title	One. meas.	Marking	Interval changes	The level of factor

$$\sigma zh = 19{,}45 - 0{,}001Q + 0{,}1B + 0{,}0000002Q2 - 0{,}002B2 + 0{,}0001QB$$

Shear strength in the adhesive layer, MPa:

$$\tau sk = -1{,}29 + 0{,}0175Q + 0{,}0265B - 0{,}000034Q2 - 0{,}00225B2 - 0{,}00002QB$$

5. Methods and mathematical models of bending VZHD ash, pine, oak.

Methods of implementation B2 plan for carpentry plate with VZHD							
Numbe	Title	One. meas.	Marking	Interval changes	The level of factor		
					-1	0	+1
1	Duration HTOD	min	T	15	15	30	45
2	The thickness of the sample	mm	H	5	10	15	20
3	Age sample	years	N	15	5	20	35

Mathematical model of arc length during bending VZHD for different types of wood, mm:

$$LYASEN = - 22{,}55 + 1{,}021T + 2{,}9H + 0{,}31N - 0{,}085TH + 0{,}023TN - 0{,}06HN$$

$$LSOSNA = - 20{,}95 + 0{,}91T + 2{,}7H + 0{,}35N - 0{,}076TH + 0{,}02TN - 0{,}05HN$$

$$LDUB = - 10{,}93 + 0{,}66 \cdot T + 2{,}1H + 0{,}0067N - 0{,}061TH + 0{,}023TN - 0{,}04HN$$

Recommendations for the use of technology in VZHD derevoobroblennya:

Recommendations for Technology joiner plates with VZHD [1]:

- humidity rails - 8 ± 2%;
- Solid wood slats for: w = 2,5t: thickness of 14 (16, 20), width - 35 (40, 50) mm;
- for rails with plates: w = 3t: thickness of 16 (18, 22), width - 48 (54, 66) mm;
- for rails array / plate: w = 4t: thickness of 14 (17, 20), width - 56 (68, 80) mm;
- consumption adhesive shield - 200-250 g / m2;
- consumption of adhesive plates - 150-200 g / m2;
- Clamps for shield temperature - 85-90 ° C;
- press for plate temperature - 115-125 ° C;
- exposure time under pressure to shield - 30-60 minutes;
- exposure time under pressure to plate - 4-6 minutes;
- pressure for shield - 0.5-1.0 MPa; for plates - 1.2-1.3 MPa;
- smallest shape stability - at a thickness lychkivok 40 ± 5% of the thickness of the plate;
- optimal ratio of thickness to width plate rails: array - 2: 3; stove - 2: 4.

Recommendations for curved pieces of technology VZHD [2]:

- humidity pieces - 25-30%;
- VZHD age - 30-50 years;
- thickness pieces - 1020 mm;
- Steaming time - 35-45 minutes;
- vapor pressure - 0,03-0,05 MPa;
- steaming temperature - 90-95 ° C;
- temperature inside the bar - 70-80 ° C;
- shop temperature - 18 ° C;
- speed manual bending - 8.12 deg / s;
- speed mechanical bending - 45-55 deg / s;
- thickness blanks for microwave installations - 2040 mm;
- time bending in microwave installations - 20-30 minutes;
- pressure bending in microwave installations - 60-80 MPa.

Recommendations to the technology of furniture shields VZHD [3]:

- bars humidity - 12 ± 1%;
- humidity difference between the bars - 2 ± 1%;
- for short gear spikes length: 5, 10, 20 mm:

Step 1.75; 3.5; 6.0; blunt - 0.2; 0.5; 1.0 mm;

- for long gear spikes length: 32, 50 mm:

Step 8.0; 12.0; blunt - 1.0; 2.0 mm;

- value for bevel gear spikes:

for short - 1 / 8-1 / 12; for long - 1 / 14-1 / 16;

- Luz at the top stud - 3-4% of the length of the spine;
- the magnitude of the tension in the joints - +0.1 mm;
- adhesive consumption for gear joints - 130-150 g / m2;
- pressing temperature - 80-120 ° C;
- time compression - 5.12 s;
- pressure to end - 1.0-1.5 MPa; for the reservoir - 0.5-0.8 MPa.

Conclusions

1. Proved that an alternative VZHD additional resource materials provided recycling and processing it in wood.
2. Used systematic approach to the development of ecologically and resource-saving technologies derevoobroblennya based VZHD.
3. Developed typical plan of sorting, cleaning and processing VZHD.
4. Determined by technologies developed basic physical and mechanical properties of the resulting product, blanks, furniture panels and carpentry plate.
5. Based on the obtained set of mathematical modelsakonomirnosti use VZHD impact on physical and mechanical properties of target products.
6. Practical advice and regime parameters for the implementation of the results of research into production.

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Yspolzovano sistemny Approach for Converting species in derevoobrabotky technology. Эksperymentalno podtverzhdeno tehnolohycheskuyu Ability Using a VIEW proyzvodstvennыh protsessah derevoobrabotky with Production Samples of products: billets kryvolyneynoy-shaped shield Mebelna, stolyarnoy stoves. Opredelenы Main physicochemical properties mehanycheskye poluchennoy products by razrabotannym technology. Options for proposals rezhymnыe

Introduction poluchennыh results of research in production. Razrabotanы resursosberehayuschye and ecologically Safe technology with Using Almost recommendations on view in derevoobrabotke.

Vtorychno yspolzuemaya Timber BUILDING, sistemny Approach; matematycheskye models, technologies derevoobrabotky, praktycheskye recommendations.

A system approach to PCW recycling was used. Technological capability of using PCW in woodworking production processes has been experimentally confirmed and commensurate product specimens were obtained: curved blanks, furniture panels, battenboards. Basic physical and mechanical properties were determined for the products obtained by the developed production techniques. To introduce the investigation-obtained results into production process, a set of operating parameters has been proposed. Resource-saving and environmentally benign technologies have been developed with practical recommendations regarding PCW utilization in woodworking industry.

Post-consumer wood, potential, system approach, physical and mechanical models, woodworking techniques, practical recommendations.

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Infrared Spectroscopic Study process of structuring the adhesive thermoplastic FILM

BJ Kshyvetskyy, Candidate of Science
National Forestry University of Ukraine

The results of infrared study processes structuring thermoplastic adhesive film, depending on moisture. The analysis of the results of research and regularities of moisture on thermoplastic adhesive connection wood.

Wood, adhesives, thermoplastic adhesive films, strength, durability, spectra, hydrogen bonds, the absorption band, the stress-deformation state.

Durability thermoplastic adhesive joints with wood moisture affect change in the environment, wood, structure and sorption capacity. Additional moisture which popadatyme in adhesive seam affect the physical, chemical and physico-mechanical processes in adhesive bonding. Changes in these processes occur at the expense of OH,