

WASTES WILL CUT OUT MDF AS RAW MATERIAL FOR PRODUCTION OF LINEAR ELEMENTS

An amount of import and export of MDF in Ukraine and some countries of Europe is given in the article. Classification of wastes which appear during a process of cutting out MDF is developed and given. Typical maps about cutting out MDF for the production of doors are analysed. On the basis of this analysis is given dependence between using of cutting tailings and the width of type. On the basis of classification of well-educated wastes and analysis of technological processes the chart of technological process of production of linear elements is developed from cutting out MDF wastes.

Keywords: the volumes of consumption of MDF, wastes, cutting out MDF, classification of wastes, percent of utilization of wastes, dependence of percent of the use of tailings from the width of type, chart of technological process of production of linear elements from cutting out MDF wastes.

Research actuality. Medium Density Fiberboard (MDF) due to the best physics and mechanicals properties, than in DSP, all wider apply in woodworking industry. Their production and consumption volumes are constantly increased (table 1). Especially actively they are used for making of facade surfaces. It is related to that this material is well added milling.

Table. 1. Production, consumption, import and export of MDF [1]

Country	Production, $\times 1000 \text{ m}^3$					Consumption, $\times 1000 \text{ m}^3$				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Austria	550	550	550	650	700	388	204	557	165	249
Italy	1000	1100	1155	1155	965	920	1116	1145	1489	1246
Germany	3633	3800	3376	3736	4603	1058	800	2743	3852	4587
Poland	1167	1506	1522	1726	1850	844	1193	1453	1583	1758
Russia	338	446	624	1152	1170	578	780	1081	1674	1703
Ukraine	–	–	–	–	–	61	140	172	182	182
France	1100	1110	1160	1180	1180	469	217	529	513	771
EU	11186	11901	11764	12394	12564	7541	7674	10832	11521	12774
Europe	12372	13772	13903	14694	14768	8721	9743	13016	13770	14945
USA	3556	3682	3896	3344	3021	5050	4940	4997	4131	3390
Country	Import, $\times 1000 \text{ m}^3$					Export, $\times 1000 \text{ m}^3$				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Austria	58	76	68	92	77	220	422	61	577	528
Italy	326	276	261	845	672	406	260	271	511	391
Germany	602	600	291	844	3252	3177	3600	923	728	3268
Poland	205	200	251	303	391	528	514	320	447	483
Russia	320	424	597	676	776	80	90	140	154	243
Ukraine	170	186	217	191	191	109	47	45	9	9
France	275	251	442	462	489	906	1144	1073	1128	898
EU	3851	4114	4594	5788	8821	7496	8341	5526	6662	8610
Europe	4352	4784	5184	6519	9426	8003	8813	6071	7444	9249
USA	1705	1510	1408	1140	821	211	252	307	353	452

During 2004–2008 in Ukraine and across all Europe was a positive dynamics of increase of amount of consumption of MDF (fig. 1). But the increase of volumes of the use of MDF results in the increase of amount of wastes. These wastes need to be in some ways utilized. Yet till recently (end of the last century) considerable attention was not spared the problem of utilization of wastes of woodworking. Mostly they were taken

out on trash or burned simply. Presently on most woodworking enterprises production wastes are using for heating of own apartments in cold time of year. Only some enterprises processing them on other products (briquettes, pellets and others like that).

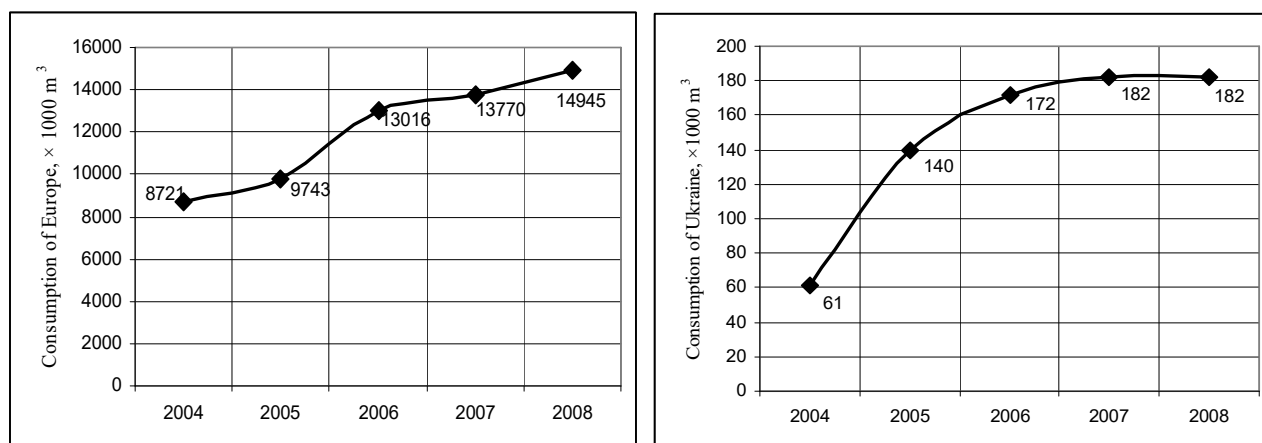


Fig. 1. Dynamics of consumption of MDF

Cutting out board materials wastes are not suitable for processing in briquette or pellets. It is therefore needed to search other variants of their utilization. One of such variants there can be processing on the purveyances of less size. For example, from wastes will cut out MDF it is possible to make purveyances for the production of linear elements. Not only ecological but also economic, value has such approach. It is instrumental in the best use of raw material and enables to get money receipts from the products made from wastes. For introduction of the adopted variant of utilization of wastes it is needed to ground its financial viability (to define the percent of utilization of wastes) and to develop the technological process of production.

Classification of cutting out MDF wastes. Without regard to all advantages above other board materials of MDF, all the same did not avoid a characteristic for this group of materials feature – formation of wastes in a process of cutting out (fig. 2).

The amount of formed under time cutting out wastes depends on the sizes of purveyances and format of flag. But conventionally to determine the not amount of wastes, but amount of the got purveyances. Parameter which characterizes the amount of the got purveyances in a process will cut out is the percent (coefficient) of useful output [2]. Under time will cut out MDF on equipment wastes of different form and sizes appear with the use of round saws. After a form the got wastes can be divided into such groups: rectangular; square; other geometrical fig.s (triangle, trapezoid and others like that).

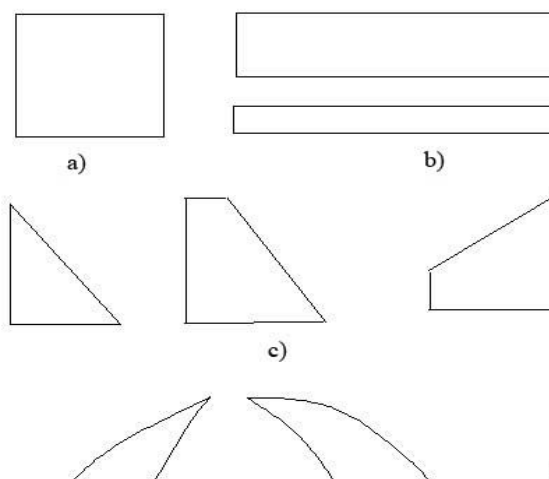


Fig. 2. Types of MDF wastes form:

- a), b), c) are types of forms of wastes formed as a result of will cut out board material on purveyances
 (a) – square;
 b) – rectangular;
 c) – are other forms);
 d) are wastes, formed in the process of production of stained-glass window details

Wastes of the first two groups are most widespread and appear at all charts of cutting out. Then it is better in all to use for the subsequent production of linear elements. It is related to that for the subsequent use them it is simple enough to cut out on the purveyances of necessary width. Wastes of the third groups – other geometrical fig.s – appear during the use in the furniture wares of details of unrectangular form. They are got during additional will cut out purveyances of rectangular or square form.

The process of utilization of such wastes for a subsequent production becomes complicated by a necessity them rational will cut out facing (with the purpose of forming of direct corner between longitudinal and transversal edge). For optimum will cut out wastes of such form it is needed to make mini-maps cutting out. It will promote the percent of utilization of wastes. During a mass production all wastes of the third groups can be divided into a few typical size. Their amount, usually, small. If in a process will cut out such wastes were separation after typical size, then their cutting out will make no difficulties: it is enough only to take a foot with one typical size wastes and to cut out it after a necessary mini-maps will cut out.

Another type of wastes MDF are wastes, formed in the process of production of stained-glass window facades and doors. Oblikuvati amount of such wastes during an individual and short-run production very hardness. Far simpler to do it during a mass production. The feature of these wastes consists in that they can have what pleasingly curvilinear form. Therefore their application for a subsequent production draws certain difficulties. For rational will cut out such wastes it is also needed to use mini-maps will cut out. A feature will cut out such wastes consists in that they do not have a base surface. It needs to be formed during first sawcut.

Determination percent utilization cutting out wastes. For determination of percent of utilization of wastes and his dependence on the width of purveyances make 10 maps will cut out MDF on door linens of typical sizes. Format of sheet of MDF – 2060 x 2620 mm. during forming of maps will cut out take into account length 2300 and breadthways 80 mm. Bring the results got as a result of such analysis in a table. 2.

Table 2. The exit of pogonag from tailings will cut out

Of map will cut out	Type №1 (80 mm)		Type №2 (66 mm)		Type №3 (50 mm)		Type №4 (40 mm)		Type №5 (30 mm)	
	% area	m.l.	% area	m.l.	% area	m.l.	% area	m.l.	% area	m.l.
1	0	0	1,13	0,93	1,64	1,775	1,31	1,775	1,50	2,705
2	3,03	2,055	5,00	4,11	3,79	4,11	4,55	6,165	5,44	9,84
3	6,06	4,11	9,44	7,755	7,15	7,755	7,24	9,81	8,58	15,51
4	6,06	4,11	9,41	7,735	9,03	9,79	8,74	11,845	9,69	17,525
5	16,16	10,955	19,22	15,795	18,35	19,905	17,71	24,015	17,86	32,285
6	10,05	6,815	9,30	7,645	9,63	10,45	9,08	12,305	10,29	18,61
7	13,08	8,865	12,23	10,05	12,81	13,89	12,42	16,845	12,59	22,755
8	14,23	9,65	14,24	11,7	14,29	15,5	15,93	21,6	16,32	29,5
9	14,09	9,55	19,00	15,61	18,13	19,67	17,28	23,43	17,44	31,52
10	13,88	9,41	16,74	13,755	16,83	18,26	15,87	21,52	16,80	30,37
Mean value	9,66	–	11,57	–	11,17	–	11,01	–	11,65	–
Sum	–	65,52	–	95,085	–	121,105	–	149,31	–	210,62

For drafting of cutting out maps the program «Sawyer» is using. It is included in software for constructing of cabinet-type furniture wares of «Woody 2.0». The middle percent of useful output of purveyances of the got cutting out maps – 84,1%. Forming

cutting out mini-maps determine the exit of purveyances from tailings will cut out for five basic width. From a table. 2 evidently, that utilization of wastes for the production of linear elements increases an useful output under time will cut out on 9–12%. Than less width of purveyances is for a production, the greater general coefficient of useful output (table 3). The percent of the use of cutting out tailings determine dividing to the area of the purveyances got from them by their general area:

$$\%_{B.3} = (S_{3.3}/S_3) 100, \% \quad (1)$$

where: $S_{3.3}$ – is an area of which is got from cutting out tailings of purveyances, m^2 ;
 S_3 – is a general area of tailings, m^2 ; $\%_{B.3}$ – it is a percent of the use of tailings.

The results of calculation are resulted in a table 4. On the basis of results, resulted in a table 4, build the chart of dependence of percent of the use of tailings from the width of type (fig. 3). As evidently from a chart, diminishing of width of type is increased by the percent of the use of tailings only to the certain limit. In this case such limit is a type breadthways 40 mm. The subsequent diminishing of width of type results in the insignificant diminishing of percent of utilization of wastes. Such phenomenon is related to the increase of losses of material on additional drank away.

Table 3. A percent of useful output is taking into account purveyances for the production of linear elements

№ of map will cut out	Useful output at cuttings out of board, %	Type №1 (80 MM)	Type №2 (66 MM)	Type №3 (50 MM)	Type №4 (40 MM)	Type №5 (30 MM)
1	95,3	95,30	96,43	96,94	96,61	96,80
2	91,2	94,23	96,20	94,99	95,75	96,64
3	87,9	93,96	97,34	95,05	95,14	96,48
4	86,6	92,66	96,01	95,63	95,34	96,29
5	77,2	93,36	96,42	95,55	94,91	95,06
6	85,2	95,25	94,50	94,83	94,28	95,49
7	82,2	95,28	94,43	95,01	94,62	94,79
8	79,1	93,33	93,34	93,39	95,03	95,42
9	77,6	91,69	96,60	95,73	94,88	95,04
10	78,7	92,58	95,44	95,53	94,57	95,50
Mean value	84,1	93,76	95,67	95,27	95,11	95,75

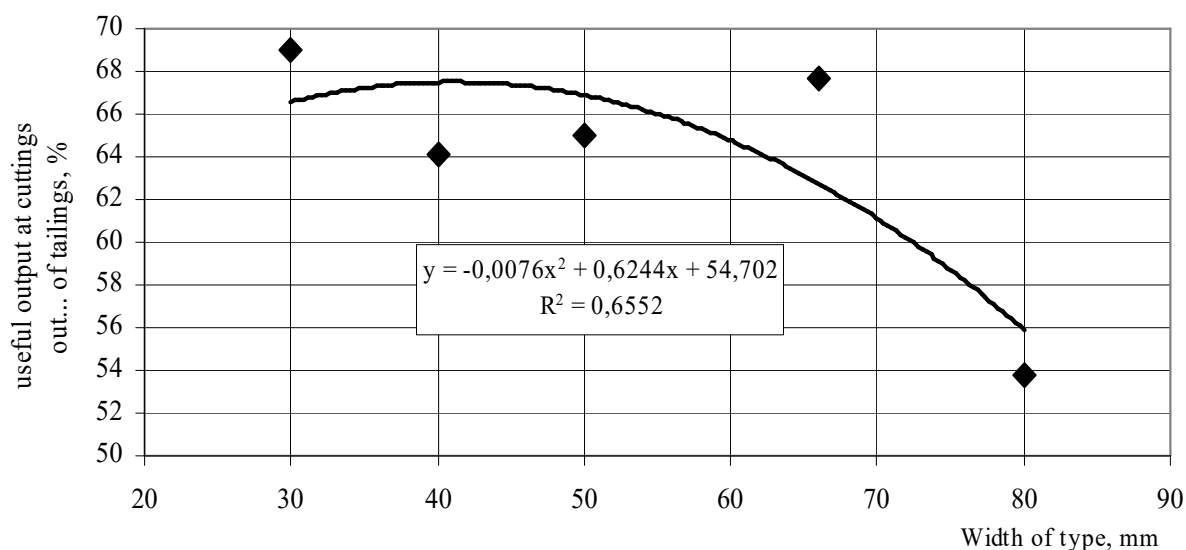


Fig. 3. Dependence of percent of the use of tailings is on the width of type

Table. 4. Percent of the use of tailings will cut out

№ of map will cut out	Useful output, %	Tailings, %	Percent of the use of tailings				
			type № 1	type №2	type №3	type №4	type №5
1	95,3	4,7	0,00	24,08	34,82	27,85	31,84
2	91,2	8,8	34,45	56,84	43,06	51,67	61,85
3	87,9	12,1	50,10	78,00	59,09	59,80	70,90
4	86,6	13,4	45,24	70,25	67,36	65,20	72,34
5	77,2	22,8	70,88	84,31	80,49	77,68	78,33
6	85,2	14,8	67,92	62,86	65,10	61,32	69,56
7	82,2	17,8	73,46	68,71	71,94	69,80	70,71
8	79,1	20,9	68,11	68,13	68,37	76,22	78,08
9	77,6	22,4	62,89	84,81	80,96	77,15	77,84
10	78,7	21,3	65,17	78,59	79,04	74,52	78,87
Mean value	84,1	15,9	53,82	67,66	65,02	64,12	69,03

Chart of technological process. On the basis of classification of well-educated wastes and analysis of technological processes develop the of principle chart of technological process of production of linear elements from cutting out MDF wastes (fig. 4).

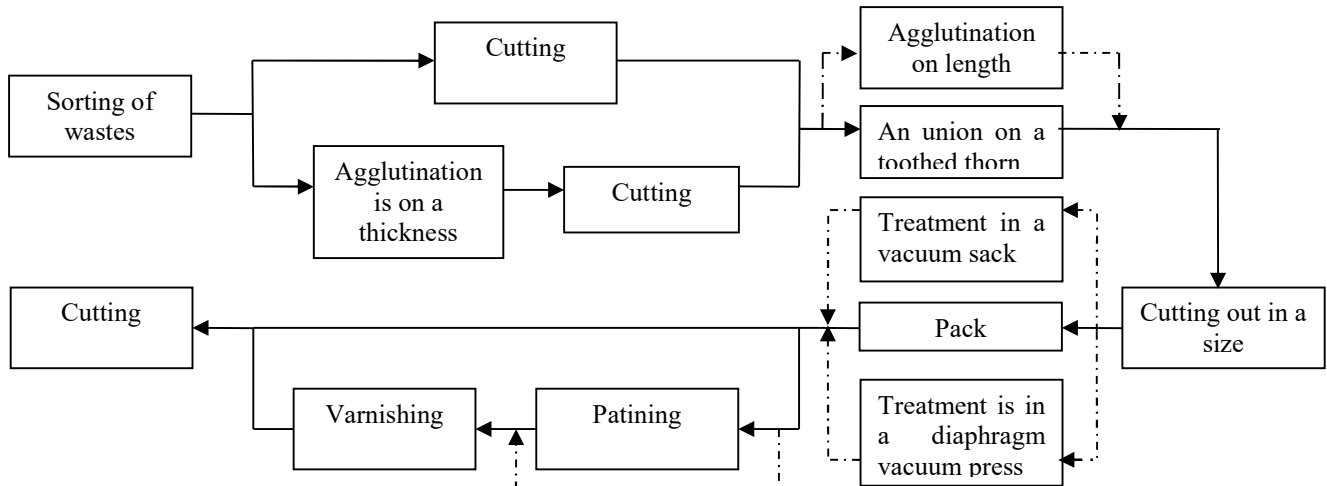


Fig. 4. Chart of technological process production of linear elements from wastes will cut out MDF

A major role in the technological process of production of linear elements from cutting out MDF wastes occupies operation of sorting of wastes after typical size. On this operation the productivity depends will cut out and rational utilization of wastes.

Conclusions. It is set that the amount of tailings in the process of production of door linens from MDF arrives at 20 %. It on condition of concomitant production of casing long 2300 mm and breadthways 80 mm. If such concomitant production is not, then the amount of tailings can arrive at 35–40 %. It is bargained that the use of tailings for the production of linear elements increases the coefficient of useful output will cut out to 12 %. It is set that the percent of the use of tailings depends on the width of type and is 50–70 %, although on occasion can exceed 85 %.

References

1. **Forest Products Statistics, 2004–2008.** – UNECE/FAO. – July 2009. – 120 с.
2. **Грицюк Ю.І.** Оптимізація розкрою ДСП на меблевій заготовці: дис... канд. техн. наук 05.21.05. – Львів: УкрДЛТУ. – 1994. – 195 с.
3. **Практическое руководство по деревообработке / Составитель Фридман И.М.** – СПб.: Политехника. – 2000. – 543 с.
4. **ТУУ 36.1–32490658–001.** Погонаж із деревоволокнистих плит середньої щільності (MDF). – К.: Фабрика «Суперпрофіль». – 2003. – 28 с.

5. **Артемчук В.В., Заяць І.М.** Методичний вказівки з розрахунку норм витрат матеріалів у виробництві виробів з деревини. – Львів: ЛЛТІ. – 1990. – 67 с.
6. **Гайда С.В., Максимів В.М., Туниця Т.Ю.** Розроблення класифікатора вживаної деревини / Ліс. госп-во, ліс., папер. і деревооб. пром-сть. – Львів: НЛТУ України. – 2008. 34: 55–68.
7. **Гайда С.В.** Хімічний склад та ступінь забруднення – основа систематизації ВЖД / Ліс. госп-во, ліс., папер. та деревооб. пром-сть. – Львів: НЛТУ України. – 2008, вип. 34. – С. 68-79.
8. **Гайда С.В.** Проблема деревної сировини у Європі та Україні / Ліс. госп-во, ліс., папер. та деревооб. пром-сть / наук.-техн. зб. – Львів: НЛТУ України. – 2007, вип. 33. – С. 55-63.
9. **Гайда С.В., Максимів В.М.** Аналіз, особливості, проблеми та досвід використання додаткових ресурсів сировини – відходів та вживаної деревини / Ліс. госп-во, ліс., папер. та деревооб. пром-сть / наук.-техн. зб. – Львів: НЛТУ України. – 2007, вип. 33. – С. 63-72.
10. **Гайда С.В.** Матеріали для виготовлення виробів з деревини. – Львів: ВМС. – 2000. 160 с.
11. **Гайда С.В.** Раціональне конструювання виробів з деревини. – Львів: ВМС. – 2001, – 93 с.
12. **Гайда С.В., Кшивецький Б.Я., Войтович І.Г., Прокопович Б.В.** Тлумачний словник з деревооброблення. – Львів: НЛТУ України. – 2002. – 280 р.

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Відходи розкрою MDF як сировина для виробництва погонажних елементів

Наведено обсяги споживання, імпорту та експорту MDF в Україні та деяких країнах Європи. Розроблено та наведено класифікацію відходів, що утворюються в процесі розкрою MDF. Проаналізовано типові карти розкрою MDF для виробництва дверних накладок (полотен) і на основі цього аналізу визначено залежність використання залишків розкрою від ширини профілю. На основі класифікації утворених відходів та аналізу технологічних процесів розроблено схему технологічного процесу виробництва погонажних елементів із відходів розкрою MDF.

Ключові слова: обсяги споживання MDF, відходи розкрою MDF, класифікація відходів, відсоток використання відходів, залежність відсотка використання залишків від ширини профілю, схема технології виробництва погонажних елементів із відходів розкрою MDF.

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STRATEGIC EVALUATION OF INVESTMENT CRITERIA THROUGH THE EYES OF A FOREIGN INVESTOR AND NECESSARY TACTICS OF UKRAINIAN FOREST PRODUCTS INDUSTRY TOWARD INVESTMENT ATTRACTIVENESS

Some of the main actions that Ukraine needs to take in order to attract good forest investors are: establishment of attractive laws and regulations, have a design/management framework targeted specifically for foreign investments that is well understood at home and abroad, advertize those opportunities through various suitable media sources, emphasize eco-friendly and green-oriented investment environment, encourage industry tours for key players in the industry of foreign countries and worldwide, comply with various certification standards and world-wide industry agreements, demonstrate technological and intellectual advances in evaluation and logistics.

In the current downturn of the economy, U.S. producers and consumers of forest products look at the foreign markets in Central America, South Africa, Asia and Eastern Europe for new and exciting investment opportunities. What are the major variables that those investors are looking for?

- Unique emerging opportunities for investment, Availability of forest resources,
- Cheap labor, Sound country-wide and forest codex laws,
- Acceptable land laws, Favorable tax base: low corporate/private taxes and fees,
- Low bureaucratic/corruptive nature, Acceptable customs regulations,
- Overall stable political and economical situation of the country,