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THE INFLUENCE OF STRUCTURE AND THE WEIGHT OF ONE SQUARE METER OF ELEMENTARY LAYERS ON PROPERTIES OF PRINTING CARDBOARD

The comparative analysis of the received experimental data testifies that, properties of printing cardboard essentially depend on structure and the weight of one square meter of its elementary layers. We defined the preferable structure of top layer (40% of bleached softwood sulphate cellulose and 60% of white paper for recycling of mark MB-1), intermediate layer (40% of bleached softwood sulphate cellulose and 60% of white paper for recycling of mark MB-2) and primary layer (60% of modular paper for recycling of mark MC-5B and 40% of white paper for recycling of mark MB-1), the layers differ in the weight of one square meter. The printing cardboard possesses the demanded physico-mechanical characteristics corresponded to TURB 00280146.030-98 in that case when the weight of one meter square is 60 g for the top layer, 50 g for the intermediate and 130 g for the primary layer.

Introduction. The development of cardboard production at present is characterized by the need to improve the quality and to reduce the cost value of developed products, and to expand considerably their range as well. The properties of printing cardboard are greatly influenced by the structure and the weight of one square meter of its elementary layers.

The characteristic of the elementary layers of printing cardboard is the existence in their composition of expensive primary fibrous raw materials – cellulose. The subsequent clay coating of a surface of a top layer promotes considerable improvement of printing properties of the cardboard. To reduce the cost value of a printing cardboard it is reasonable, in our opinion, to replace a part of deficient and expensive cellulose (primary fibrous raw materials) with cheaper and available secondary fibrous raw materials – waste paper.

One of perspective ways of management of properties of a printing cardboard together with simultaneous decrease of its cost is purposeful change of the structure and the weight of one square meter of its elementary layers. Thus, it is possible, in our opinion, to solve an important problem consisting in partial replacement of expensive and imported cellulose in elementary layers of a cardboard on more available raw materials – domestic waste paper.

Researches as they represent scientific and practical interest are carried out in this direction.

The purpose of the researches – to study properties of a printing cardboard depending on structure and weight of one square meter of elementary layers.

Main part. The work was done in two stages: at the first stage – properties of manufactured elementary cardboard layers with different composite structure on fiber were studied; at the second – the preferable weight of one square meter of elementary layers of cardboard containing necessary chemicals was defined.

At the first stage the influence of structure of elementary layers of cardboard (top, intermediate and primary) on them physico-mechanical characteristics was studied. The structure of elementary layers was changed by decreasing the content of cellulose from 100 % to 0 and increasing the content of waste paper from 0 to 100 %. The top layer contained bleached softwood sulphate cellulose and white recycled paper MB-1; the intermediate layer included bleached softwood sulphate cellulose and white recycled paper MB-2; the primary layer – recycled paper MC-5B and white recycled paper MB-1. The weight of one squaremeter of elementary layers of cardboard in all cases was 80 g. For the received samples of elementary layers of cardboard by standard techniques we determined absorbency at unilateral wetting, thickness, breakdown force when dry, breaking length, elongation when dry and wet strength.

The comparative analysis of physico-mechanical characteristics of samples of elementary layers of cardboard (top, intermediate and primary) showed that the samples of elementary layers having the following composite structure: top layer – 40% of bleached softwood sulphate cellulose and 60% of white recycled paper MB-1, intermediate layer – 40% of bleached softwood sulphate cellulose and 60% of white recycled paper MB-2, the primary layer – 60% of recycled paper MC-5B and 40 % of white recycled paper MB-1.

At the second stage 13 samples of the printing cardboard, different in the weight of one square meter of the top, intermediate and primary layers (Table) are manufactured. AKD glue emulsion (an expense of 0.106 % from a. d. s.) and cationic starch paste (an expense of 0.71 % from a. d. s.) were added into the top and primary layers of the cardboard, that provided cardboard with demanded hydrophobic behavior and durability.

The weight of one square meter of elementary layers of poligrafic cardboard

Number of sample of cardboard	The weight of one square meter of elementary layer, g			The weight of one square meter of cardboard, g
	top	intermediary	primary	
1	80	80	80	240
2	70	70	100	240
3	60	60	120	240
4	50	50	140	240
5	70	80	90	240
6	70	60	110	240
7	70	50	120	240
8	60	80	100	240
9	60	70	110	240
10	60	50	130	240
11	50	80	110	240
12	50	70	120	240
13	50	60	130	240

The results of researches are given below: Fig. 1 – thickness of printing cardboard depending on the weight of one square meter of elementary layers, Fig. 2 – hydrophobic properties of printing cardboard, which are characterized by absorbency at unilateral wetting, Fig. 3 – breaking length of cardboard.

It is received that properties of printing cardboard greatly depend on the structure and the weight of one square meter of its elementary layers. High-quality printing cardboard can be produced by the using of white recycled paper (60%) instead of the equal amount of cellulose in composition of the top, intermediate and primary layers.

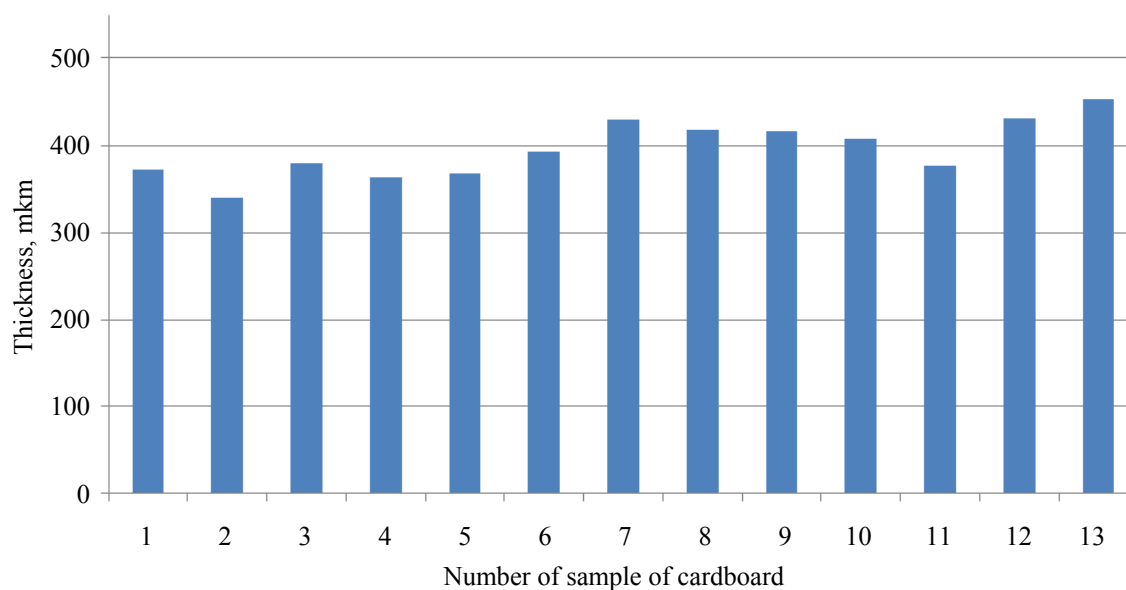


Fig. 1. Thickness of printing cardboard depending on a weight of one square meter of its elementary layers

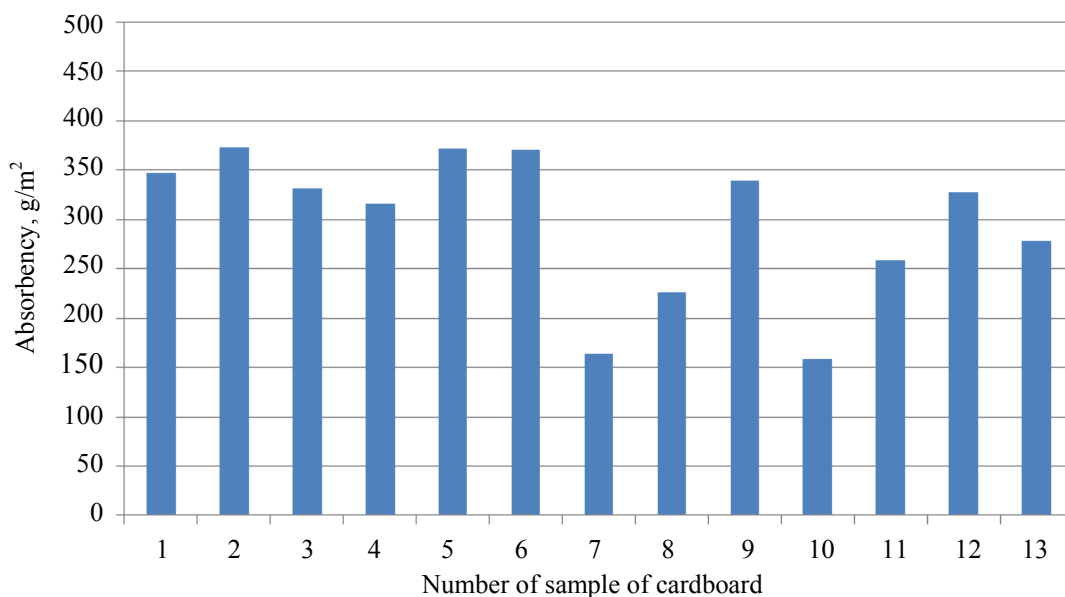


Fig. 2. Absorbency of printing cardboard depending on a weight of one square meter of its elementary layers

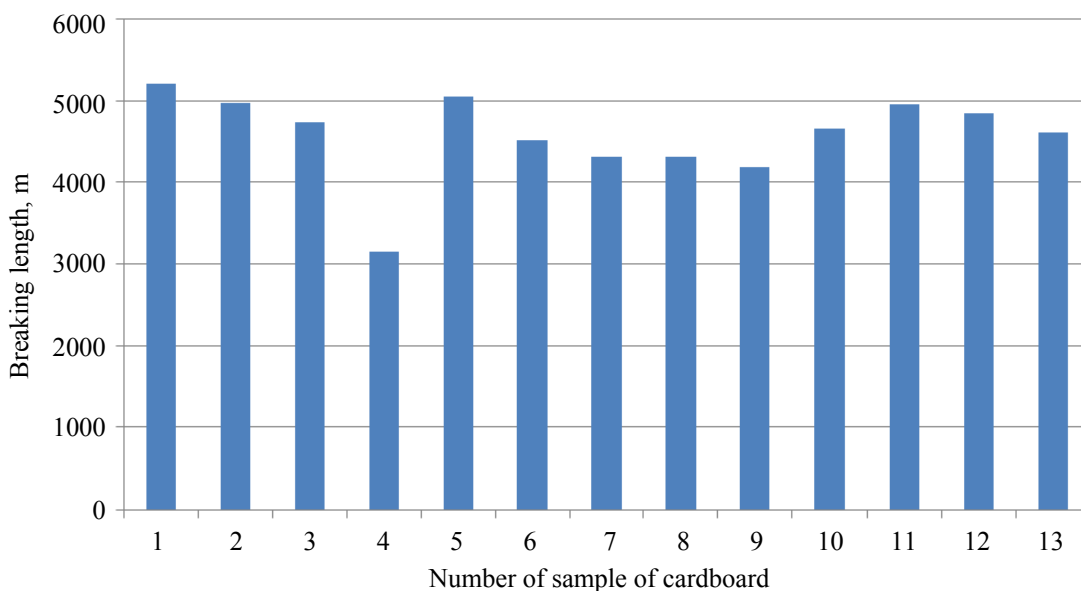


Fig. 3. Breaking length of printing cardboard depending on a weight of one square meter of its elementary layers

Conclusion. The preferable structure of the layers is defined: the top layer (40% of bleached sulphate softwood cellulose and 60% of white recycled paper MB-1), the intermediate layer (40% of sulphate bleached sulphate softwood cellulose and 60% of white recycled paper MB-2) and the primary layer (60% of recycled paper MC-5B and 40% of white recycled paper MB-1), they are different in the weight of one square meter. The printing cardboard possesses demanded physicome-

chanical characteristics which are corresponded to TURB 00280146.030-98 in the case when the weight of one square meter is 60 g for the top layer, 50 g for the intermediate and 130 g for the primary layers.

References

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