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Quality Of Wood Drying Which İs Using İn Residential Buildings Depending On İts Thickness (Case study timber of beech, with different thickness that is drying in conventional kiln in the territory of Kosovo)

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Quality of Wood Drying Which is Using in Residential Buildings Depending on its Thickness (Case study timber of beech, with different thickness that is drying in conventional kiln in the territory of Kosovo)

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Abstract. Wood processing industry is one of the most developed industries in Kosovo.In the framework of this industry, special importance should be given to the wood drying process, as a necessary process for further processing of wood.Therefore, a proper study of the drying quality of sawn boards which is using in residential buildings would be necessary.For the study were taken 13 subjects which are stretch throughout the territory of Kosovo.The study shows that the sawn timber in thickness 25-37mm, is drying well, but lacks air conditioning and equalization of moisture content throughout its thickness.While timber thickness 38-49mm and 50-70mm, did not dry enough, lack of moisture equalization throughout the thickness and conditioning is not done at all. The following results provide data for three thicknesses obtained in the study.Thickness (mm).

Thickness (mm)	*Number of samples*	*Average moisture content in shell (%)*	*Aver. moisture content in core (%)*	*Aver. moisture content in shell (%)*	*Aver. for all thicknesses (%)*
25-37	*52*	*7,16*	*8,86*	*7,17*	*7,73*
38-49	*44*	*12,61*	*14,65*	*12,71*	*13,12*
50-70	*33*	*13,1*	*16,74*	*12,88*	*14,24*

In conclusion we can say that the sawn timber over 37mm thickness, is not eligible for further processing products used in residential and domestic objects is in contradiction with EU norms.

Keywords: equilibrum, moisture, prong tests, shell, core.

1 Introduction

Water in wood normally moves from higher to lower zones of moisture content. This fact supports the common statement that "wood dries from the outside in," which means that the surface of the wood must be drier than the interior if moisture is to be removed. Drying can be broken down into two phases: movement of water from the interior to the surface of wood, and removal of water from the surface. Moisture moves to the surface more slowly in heartwood than in sapwood, primarily because extractives plug the pits of heartwood. In drying, the surface fibers of heartwood of most species reach moisture equilibrium with the surrounding air soon after drying begins. This is the beginning of the development of a typical moisture gradient (fig. 1), that is, the difference in moisture content between the inner and

outer portions of a board. If the air circulation is too slow, a longer time is required for the surfaces of sapwood to reach moisture equilibrium. This is one reason why air circulation is so important in kiln drying. If it is too slow, drying is also slower than necessary and mold might even develop on the surface of lumber. Water moves through wood as liquid or vapor through several kinds of passageways. These are the cavities of fibers and vessels, ray cells, pit chambers and their pit membrane openings, resin ducts of certain softwoods, other intercellular spaces, and transitory cell wall passageways (Panshin and de Zeeuw 1980).
Lighter species in general dry faster than heavier species because their structure contains more openings per unit volume.

Sometimes the boards are not drying in a uniform way. This can be caused of various reasons but the most important things are:

- The difference of moisture content in the boards,
- Non-conditioning of boards and
- Uneven drying of boards.

As a result, wood elements may suffer the different tensions and then they can be distorted and destroyed a whole product. Even worse would be the case if the wood elements sawn in two or more parts, and those two or m re parts of woods are used for parquet, because, one side of these elements will have low moisture, while, the other side will have high moisture and as a result, the prisms of parquet will be distorted. This is the reason why this problem has taken a special importance and many tests are done to obtain correct results. As we know from European Union norms, the average moisture content of wood for residential houses must be between 8 or 10%, in all thickness.

2 Goals of the Research

The goal of this research is:

- To determine the quality of dried boards after drying, depending on the distribution of moisture content across the different thickness (25-37mm, 38-50mm and 50-70mm).

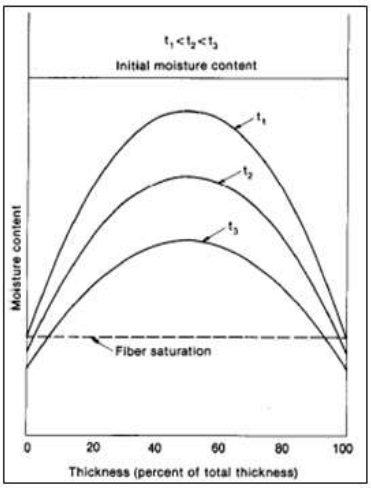


Fig 1. Typical moisture gradient in lumber during drying at times

Fig.2. Red circles shows places where samples are taken for the study

3.

Materials And Methods

During the preparation of this research are used different materials that were needed to complete the study. Materials (samples) that are used here mainly are taken from the kiln operators distributed in the

territory of Kosovo. In figure 2. are marked the places where samples were taken for study (13 operators stretch throughout the territory of Kosovo).

For study was chosen beech timber, it is because all of our researches that we done reported that, in Kosovo the majority of wood processing are using this kind of wood. Areas where this species of wood are taken are: Kamenice, Jezerc, Globoqice, Kacanik, and Decan.

Works in terrain

During the work in terrain are making several visits to enterprises for listed, followed and taking samples for further working. First visits are done during filling the kiln chamber, and then they are visited during drying to determine the condition of the boards. The same enterprises also are visited after drying. This is done to obtain necessary samples to determinate the distribution of moisture content in the thickness of boards.

Fig 3. Stocking boards and marked samples

To prove the non-uniformity of moisture during timber drying are made "prog" tests which shows the quality of drying depending on moisture content in core and shell of boards.

Material preparation

Materials for the study are improves from enterprises immediately after kiln drying is done figure 5. Boards just after drying are sawn according to standard recommendations (5586 ML88, for thicknesses 25-37 and 38-49 figure 4a, while for thickness 50-70mm samples are taken with recommendation that shown in figure 4b). To test core and shell of sawn material are weighed the outer (surfaces) and the inner (core) parts (figures 5a and b). Immediately after initial weighing, samples are brought to the laboratory of FAS in Ferizaj and are oven dried in the thermostat to 0% of moisture content (drying temperature 102 ± 30C), samples are weighed several times until it reached the same weight after three measurements (weighted).

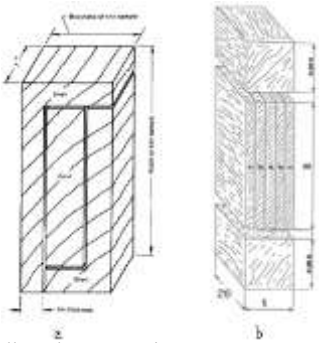


Fig 4. Method of cutting section for measuring shell and core moisture content. (ML88 5586). a. for thickness 25-37 and 38 to 49 and b. for thickness 50 to 70

Also to establish no-uniformity of moisture content on boards we have made "prongs" probes (Figure 6a and b) which show the performance of major tensions with bending toward the center of the boards (Figures 6).

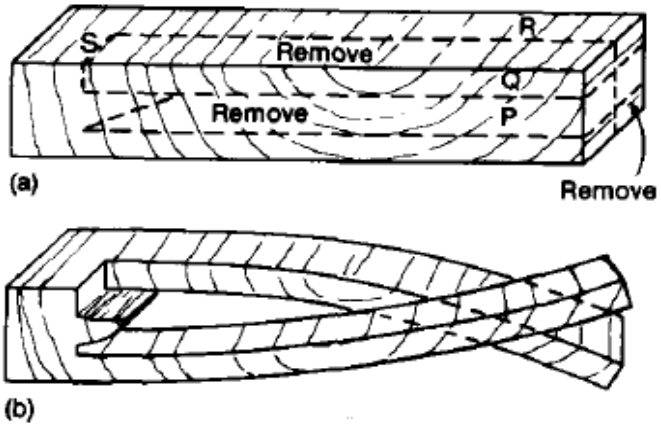


Fig 6 (a) Method of cutting stress sections for severe casehardening tests. (b) Prongs are offset so that they can cross and indicate severity of casehardening. (ML88 5584)

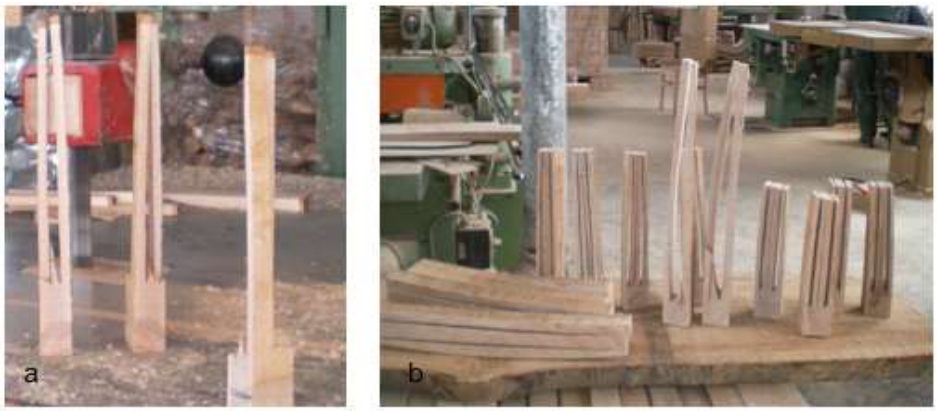


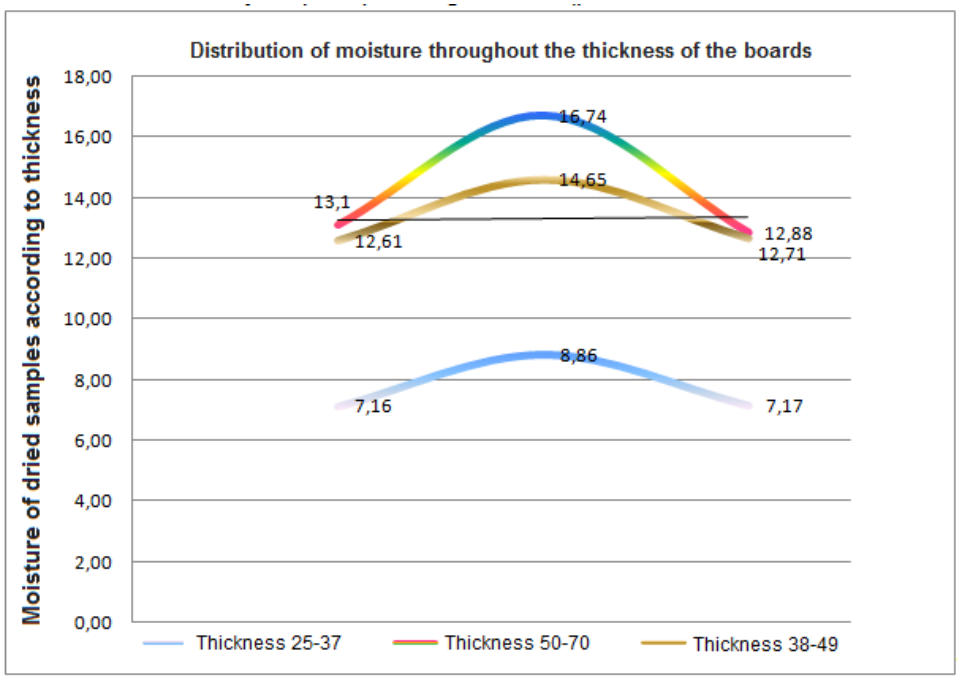
Fig 7. Samples for prongs probes with different thicknes

4 Results

Table 1. Show the number of samples and moisture content for three different thicknesses.

Thickness (mm)	Number of samples	Average moisture content in shell	Average moisture content in core	Average moisture content in shell	Average for thicknesses
25-37	52	7,16	8,86	7,17	7,73
38-49	44	12,61	14,65	12,71	13,12
50-70	33	13,1	16,74	12,88	14,24

Data from the Table 1. Are shown in figure number 10.



5 Conclusions

Based on the results we can conclude that the quality of wood drying in Kosovo is not satisfactory. Good results of the wood drying are founded in thickness 25-37mm, but the average of moisture content and conditioning are not done. Poor results were found in two other thicknesses (38-49 and 50-70mm), expect high moisture content that we have seen on boards, also are found non-uniformly dried lumber (different distribution in core and shell). The same results are shown from the "prongs" samples which obviously have significant tension and both sides are curved toward the center which means that the moisture in the core is higher than in the shell, as a such wood products that are drying in convectional kiln in Kosovo does not fulfill European Union conditions for residential houses 6-10%.

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