The Difference of Trunks Use into Timber Completely and Partially Sawn for Gross Products, with 30mm Thickness, which are Used in Construction

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Abstract

Gross wood products used in construction are of different types and sizes. Mainly it is used timber of coniferous species. Sawing trunks in this study was done in vertical saws, and cleaning of side boards was done in circular saw machines. Trunks that are sawn for this purpose are mainly imported from near countries (Montenegro, Bosnia etc.). Their lengths range from 4-8 m, and an average diameter of 20-80 cm. To obtain reliable results in this study, there were taken 10 fir trunks. 5 trunks have been sawn and milled completely and 5 others partially. The results of the study are: Trunks volume is 3.293m³. Sawn and cleaning of side boards 1.134 m³ boards or 69.67% Sawn and partially cleaning of wood materials often fulfill the demands of the market which give 1.240 m³ boards or 74.48%.

Keywords: sawn timber, coniferous, band saws.

1. Introduction

The 1998-99 war destroyed a large number of houses (over 1200). After the war in Kosovo, began the reconstruction of houses and other construction of buildings that were burned down by the war. Since then, wood has been used a lot in construction as secondary as well as basic material for roofs. Gross products used in construction are of different types and sizes but mainly conifer trees. As gross products are mainly used boards with thickness 20mm, 25mm, 30mm, 50mm, etc., as well as a prism with rectangular section 10x8cm, 11x9cm, 10x10cm 12x10cm, etc.

To saw trunks are mainly used band saws whereas milling timber are mainly used circular saws. For the construction of roofs in visible places is often used planed wood. According to the studies conducted by the Ministry of Trade and Industry (MTI) in 2008, timber imported in Kosovo is much greater than it is exported. In 2006 the difference was about 223797m Probability of sawing trunks in forests is about 300.000m3. From this amount, 70-80% can be used as trunks, which means 210 000-240 000m³ trunks. The coefficient of trunks conversion into sawn timber is estimated to be around 0686. According to this, the potential quantity of sawn material which can be produced is between 142 500-163 000m³.

However, there are no specific information about the structure of sawmills. Sawmills data about the structure and sawing capacity of trunks are variable. A study done (Ukaj, Abazi 2009), shows that the sawmill capacity for production of sawn timber are between 50.000-1000m³.

2. The aims of the study

The percentage of trunks use in partially milled boards
The percentage of trunks use in sawn boards

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3. Materials and Methodology

During this study, we have collected data from construction companies and timber industries.

Materials used

Coniferous trees,
Band saw,
Trunks caliper,
Meter.

Methodology used

The use of trunks during sawing in gross products for construction is done in terrain.
Measurement of trunks volume is done by the equation:

$$V = \frac{D^2 * \pi}{4} * l \quad [m^3$$

Where:
D- Average trunk diameter,
l- Trunk length.

Then, it was begun with cutting and milling of trunks that has been given from sawing. After milling, boards were measured one by one in length (1) width (a) and thickness (b) and we have calculated their volume by equation:

$$V = l * a * b \quad [m^3]$$

Since sawn timber (30mm thickness boards) is used in construction mainly as secondary material, they do not need to be a superior quality. If boards were produced partially sawn, there would be a greater percentage use of trunks into timber.

To better understand sawing of trunks, it was built a sample as follows on fig. 1. Trunk length was taken 4m. Its diameter is 0.37m.

a   b
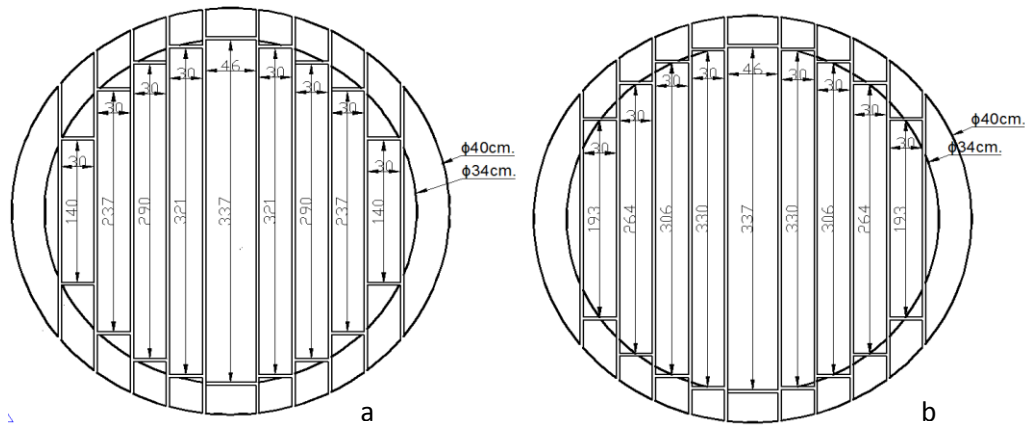
Sawing trunks data are also shown in table 1.

According to the sawing method in fig. 1a, it is seen that boards are completely sawn. In fig. 1b, it is seen that boards are not completely sawn and the boards' width in fig.1b, is wider, which has impact in growth percentage.

According to table 1, we can conclude: boards that are completely sawn give efficiency 5.87% lower than boards that are partially sawn. Sawing boards method is seen in fig. 2.
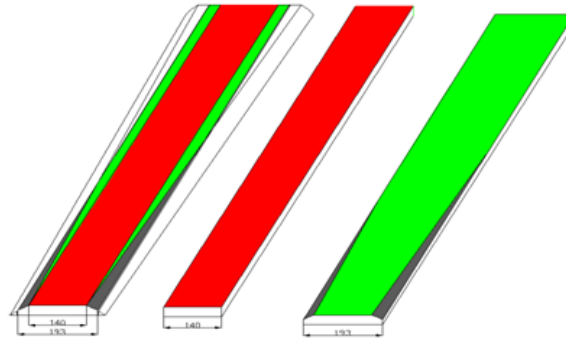

Figure 2. Sawing boards method: a) rough board, b) completely sawn board, c) partially sawn board board.

4. Results and discussions

In this study were taken 10 sawn trunks which are sawn with band saws and cleaning of boards are sawn circular machines. In each sawmill were sawn by 2 trunks with same length and diameter. Table 2 shows the measure results of cleaning boards, and table 3 shows the measure results of rough timber.

Table 1: _S_awing trunks results

	Width, m	Thickness, m	Length, m	Volume, m³	Percentage		Width, m	Thickness, m	Length, m	Volume, m³	Percentage
Board 1	0,140	0,030	4	0,017	3,91	Board 1	0,193	0,030	4	0,023	5,39
Board 2	0,237	0,030	4	0,028	6,61	Board 2	0,264	0,030	4	0,032	7,37
Board 3	0,290	0,030	4	0,035	8,09	Board 3	0,306	0,030	4	0,037	8,54
Board 4	0,321	0,030	4	0,039	8,96	Board 4	0,330	0,030	4	0,040	9,21
Board 5	0,337	0,046	4	0,062	14,42	Board 5	0,337	0,046	4	0,062	14,42
Board 6	0,321	0,030	4	0,039	8,96	Board 6	0,330	0,030	4	0,040	9,21
Board 7	0,290	0,030	4	0,035	8,10	Board 7	0,306	0,030	4	0,037	8,54
Board 8	0,237	0,030	4	0,028	6,62	Board 8	0,264	0,030	4	0,032	7,37
Board 9	0,140	0,030	4	0,017	3,91	Board 9	0,193	0,030	4	0,023	5,39
Total boards				**0,299**	**69,57**	**Total boards**				**0,324**	**75,44**
Trunk volume				**0,430**		**Trunk volume**				**0,430**	

Table 2. Sawn timber.

Nr.	Trunk length, m	Trunk diameter, m	Trunk volume, m^3	Volume of milled boards, m^3	Percentage of milled boards
1	4	0,30	0,283	0,194	68,65
2	4	0,27	0,229	0,154	67,28
3	4	0,35	0,385	0,269	69,93
4	4	0,37	0,430	0,307	71,42
5	4	0,31	0,302	0,210	69,59
Total			1,628	1,134	69,67

Table 3. Partialy sawn boards

Nr.	Trunk length, m	Trunk diameter, m	Trunk volume, m^3	Volume of milled boards, m^3	Percentage of milled boards
1	4	0,30	0,283	0,207	73,25
2	4	0,28	0,246	0,180	73,12
3	4	0,35	0,385	0,289	75,13
4	4	0,37	0,430	0,325	75,60
5	4	0,32	0,322	0,239	74,33
Total			1,665	1,240	74,48

According to table 2, it is seen that the volume of 5 sawn trunks is 1.628 m^3. If boards are sawn completely which it is not necessary, the volume of milled boards will be 1.134 m^3 or shown in percentage 69.67%.

According to table 3, it is seen that the volume of 5 sawn trunks is 1.665, whereas the volume of boards that are saw partially is 1.240 or shown in percentage 74.48%. Data from table 2 and 3 are shown graphically in figure 3 and 4.
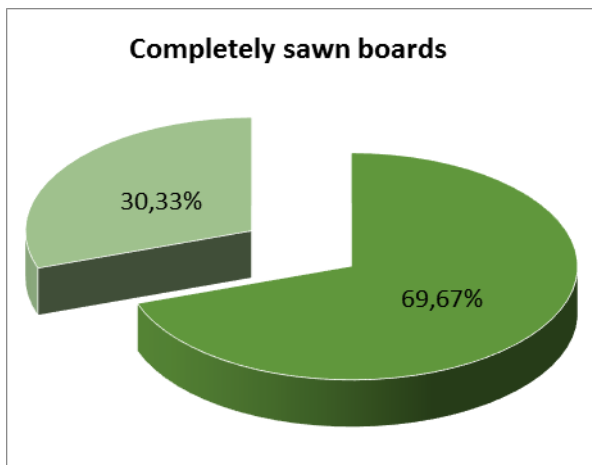

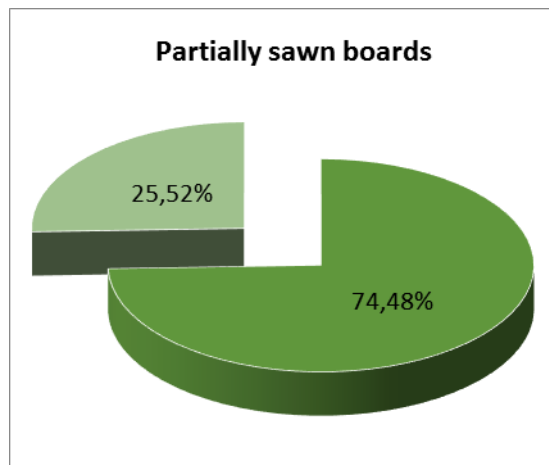**Figure 3 The use precentage of boards completely sawn**

Figure 4. The use precentage of boards partially sawn

Seen by figures 3 and 4, it is noticed that, boards milled completely give efficiency 69.67% whereas boards milled partially 74.48%. This shows us that, from production of boards that are partially cleaning, it is benefited 4.81% more sawn timber. This affects directly in profit of enterprise. In Kosovo market, 1 m^3 coniferous timber is traded with €165-180 per m^3, with an average of €172.5 perm^3.

Conversion of 1m³ trunks in sawn timber is calculated according to equation:

$$\mathrm{R_v} = \frac{V}{Q} \quad m^3 trunks/m^3 sawn\ timber$$

Where:
V -volume of sawn timber in m³
Q- volume of trunks in m³

It is calculated that, if boards are completely cleaning, its volume from table 2 is 1.134, and we will have:

$$\mathrm{R_v} = \frac{V}{Q} = \frac{1.134}{1.628} = 0.697\ m^3 trunks/m^3 sawn/board$$

If boards are completely cleaning, its volume from table 3 is 1.240, and we will have:

$$\mathrm{R_v} = \frac{V}{Q} = \frac{1.240}{1.665} = 0.747\ m^3 trunks/m^3 sawn\ timber$$

According to these data, it can be estimated the price difference, which is:

*0.697*172.5= €120.23*
*0.740*172.5= €128.86*

According to the calculations of 1m3 trunks, the difference of boards milled completely and partially is € 8.63. For Kosovo economy it is a big and significant difference

5. Conclusions and recommendations

According to the study, these are the conclusions:

- From 1.628 m3 the use in sawn timber, completely cleaning is 1.134 m3 or 69.67%.
- From 1.656 m3 the use in sawn timber, partially cleaning is 1.240 m3 or 74.48%.
- Protection of trunks is not made by any method and some of them may begin to degrade, especially in the hottest periods of the year.
- There is no separation of trunks in diameter. The diameter separation will enable an easy calculation of sawing models.

To increase the efficiency of sawn material, it is recommended:

- To divide the trunks in diametric groups,
- To make sawing models and calculate maximum models for each diametric category for a better use.
- To make more appropriate sawing models for greater efficiency,
- If the boards remain located in buildings which are visible even after the completion of the work, they should be fully milled even though their price is higher.
- The parts, like slats that remain which result during of sawing process, should be used as a roof batten in construction.
- To be careful of sawn timber quality in order to have a good quality and production efficiency.
- Wood residue, slats, and sawdust to be used as secondary purposes, like pellets and briquette,
- To draw boards shorter than the trunks by the conical parts of the trunks.
- When boards are required to be as secondary material, they should be partially cleaning because the use would be higher for 4.81%.

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