

## Value assessment for deciduous timber (birch, alder) logs for plywood manufacture

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**Abstract:** *Value assessment for deciduous timber (birch, alder) logs for plywood manufacture.* This paper is the next outcome of the Zespół Organizacji, Ekonomiki i Projektowania Zakładów Przemysłu Drzewnego team work on the basic subject of „Metody wyceny wartości surowca drzewnego w przerobie przemysłowym” (Value assessment methods for raw materials in industrial processing). A simplified calculation formula is applied because the influence of some factors on the results is insignificant (Szczawiński M., Jencyk-Tołłoczko 2010). The results of raw material value assessment in the plywood manufacture proved usability of the proposed method, as well as showed that the traditional plywood structure (with cheaper and lower quality timber used for internal plies) is profitable. The calculation value of timber is significantly higher than the market value thereof.

*Keywords:* plywood, raw material value, production profitability.

### INTRODUCTION

This article is the next outcome in the sequence of the Zakład Organizacji, Ekonomiki i Projektowania Zakładów Przemysłu Drzewnego work on the basic subject.

The practical application of the previously-proposed calculation formula induced the research team to simplify the formula for practical application in the wood sector. The earlier formula versions included consideration for interest rates on the capital engaged in the manufacturing process. Still, calculation results showed an insignificant influence thereof on the raw material value assessment (Szczawiński, Jencyk-Tołłoczko 2010). Therefore, the new methodology makes consideration for financial effects of delayed payments from customers (‘delay’ should be understood as the time from product shipment till payment).

This document includes calculations for plywood, both for dry applications and waterproof, 6 mm thickness, different quality grades.

### METHODOLOGY

The value assessment of round timber processed into plywood was made with application of a simplified formula containing three components:

$$W_{di} = A - B + C,$$

where:

A – discounted (discounted = with consideration for interest on delayed payments from customers) receipts from sales of 1 cu.m. of processed raw materials, for the gross operating margin applied (= before tax), in PLN/cu.m. for raw material,

B – purchase, transport and processing costs per 1 cu.m. of raw material, in PLN/cu.m. for raw material),

C – receipts from sales of post-processing waste, after tax, in PLN/cu.m. for raw material).

$$W_{di} = \frac{a_i(P_i \pm \Delta z)}{(1+r)^P(1+m)} - k_t - k_p + f(1-v_i)(c_o - k_o)$$

where:

$W_{di}$  – value of raw material being processed into ‘i’ plywood type (PLN/cu.m.),

$a_i$  – raw material processing efficiency for ‘i’ plywood type (cu.m./cu.m.),

(The involved production plant provided with the value of 0.38, which seems too low. Nevertheless, this value was used for further calculations. In Ratajczak [1998], this value is much higher: as high as 0.48 (attachment 3, page 205). Having adopted the value of 0.38 (presumably, the value provided by the manufacturer was lower than the actual value), calculations proved that the timber-into-plywood processing is highly profitable.)

$P_i$  – average weighted unit sales price for ‘i’ plywood type for different quality grades (PLN/cu.m., plywood),

$\Delta z$  – inventory difference for finished product stock (in this example:  $\Delta z = 0$ ),

$r$  – discount rate meaning the interest on capital per one day of payment delay from the customer, adopted acc. to the interest on two-year State Treasury obligations (approx. 5% annually),

$p$  – number of days waiting for receivables from customers (number adopted for calculations: 30 days - because after exceeding that time length, the supplier is entitled to claim statutory interest on delay (approx. 10% annually),

$f$  – company share in the gross profit ( $f_{2008} = 0,81$ ),  $m$  - assumed gross profitability (before tax) for plywood manufacture and sales,

$k_t$  – unit cost for raw material purchase + delivery to the manufacturing plant (PLN/cu.m. for raw material),

$k_p$  – raw material-to-plywood processing cost (PLN/cu.m. for raw material),

$C_o$  – gross receipts (before tax) from post-production waste sales (PLN/cu.m., for raw material):

$C_o = C_w \times U_w + C_z \times U_z + C_{zr} \times U_{zr}$ , where:

$C_w$  – average sales price for post-veneering shafts (PLN/cu.m.),

$U_w$  – shaft share

$C_z$  – average sales price for edgings (PLN/cu.m.),

$U_z$  – edgings share,

$C_{zr}$  – average sales price for chips (PLN/cu.m.),

$U_{zr}$  – chips share.

The financial data for the year 2008 are courtesy of a significant plywood manufacturing plant located in Poland. No further detailed data may be disclosed due to the business secret.

#### VALUE ASSESSMENT FOR ROUND TIMBER PROCESSED INTO PLYWOOD

The round timber value assessment makes consideration for different 1.5 veneer batches: two internal layers, and three external layers.

The structure of raw material consumption for plywood manufacture is a result of ply layout within the board, and of various demands for different raw material grades. In practice, better raw materials are used for the external layers, worse (cheaper) raw materials for internal layers - that differentiation has been applied for many years. Additionally, consideration should be made for more difficulties purchasing raw materials of the highest quality in the timber market. That is the starting point for calculating the average material purchase price, which can be the basis for comparison with the value thereof after processing.

The involved company uses materials for five-ply boards, with veneer thickness of 1.5 mm:

- a) For moisture-resistant plywood:
- WAO finishing plies 0.4 x 310 = 124 PLN/cu.m.
  - WCO internal plies 0.6 x 180 = 108 PLN/cu.m.
  - Total 232 PLN/cu.m.
- b) For water and boil-proof plywood:
- WAO finishing plies 0.4 x 310 = 124 PLN/cu.m.
  - WBO internal plies 0.6 x 250 = 150 PLN/cu.m.
  - Total 274 PLN/cu.m.

The calculation formula makes consideration profit from waste sales. The sales value (per 1 cu.m. of raw material) for post-production waste with the processing efficiency is contained in Table.

Table 1. Receipts from sales of plywood production waste

Item	Waste type	Average sales price (PLN/cu.m.); after deduction of preparation for sales costs	Share (%)	Receipts from sales of material waste (PLN/cu.m.), calculated per 1cu.m. of raw material
1	Shafts	119	30	22.3
2	Edgings	36	14	8.7
3	Chips	40	51	4.4
4	Sawdust, dust	-	5	-
Total			100	35,0

Source: own calculations

After deduction of 19% income tax, the net receipts will be approx. 29 PLN/cu.m. of raw material. Receipts from sales of sawdust and dust per na 1cu.m. of raw materials were omitted as neglectable.

The value assessment for birch and alder raw materials processed into 6 mm plywood, three quality grades, is contained in Table 2.

Table 2. Birch and alder round timber processed into 6 mm plywood

Item	Type	Average weighted sales price (PLN/cu. m.)	Discounted receipts from plywood sales, per 1 cu.m. of raw materials (PLN/cu.m.)*	Costs (PLN/cu.m. of raw materials)		Raw materials value (PLN/cu.m.) fore gross profit margin of:				Average procure ment price (PLN/c u.m.)
				Purchase and delivery	Processi ng	0.00	0.10	0.15	0.20	
1	Moisture resistant	2400	877	70	558	278	265	242	233	232
2	Weather and boil proof	3000	1096	76	630	419	376	358	344	274

\* with consideration for deduction of interest on delayed payments from customers.

Source: own calculations

The calculation result analysis shows that the value of both birch of alder round timber is significantly higher than the average purchase price thereof resulting from the demand structure (for 6 mm plywood). The average raw material purchase price would equal the

calculation value should the gross profit margin be as high as 20%. That is a confirmation that the plywood manufacture is satisfactorily profitable.

#### CONCLUSIONS

- A simplified timber value assessment formula can be helpful for plywood manufacturers while negotiating with raw material suppliers. Besides, the formula determines options for acceptance of auction prices given specific technological and organisational conditions as well as the market situation.
- With the traditional board structure, plywood manufacture is highly profitable.

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**Streszczenie:** *Wycena wartości liściastego drewna okrągłego (brzoza, olcha) w przerobie na sklejkę.* Publikacja stanowi kontynuację prac zespołu Organizacji, Ekonomiki i Projektowania Zakładów Przemysłu Drzewnego nad tematem statutowym „Metody wyceny wartości surowca drzewnego w przerobie przemysłowym”. Wykorzystana została uproszczona formuła rachunku, bowiem wpływ niektórych czynników na wyniki obliczeń okazał się być nieistotnym (Szczawiński M., Jencyk-Tołłoczko I. 2010). Wyniki wyceny wartości surowca w przerobie na sklejkę wykazały przydatność proponowanej metody oraz fakt, iż opłacalne jest stosowanie tradycyjnej konstrukcji arkusza przez wykorzystania gorszego, tańszego drewna na warstwy wewnętrzne. Wartość obliczeniowa drewna jest znacząco wyższa niż jego cena rynkowa.

**Słowa kluczowe:** sklejka, cena surowca, opłacalność produkcji.

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