

Rosta Tamás

**Manufacturing of black locust plywood with high strength
and weather-resistant parameters**

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1. Introduction

Wood is the only one available industrial raw material, whose yield does not cause decrease due to means of mining activity, because it grows on readily available natural resources (water, carbon-dioxide, solar energy).

Recently in Hungary, potential wood material abundance and absence of some wood material assortments are existing side by side. Rate of qualitative wood raw material is seemingly low that results raw material supplement limits in veneer and sawmilling industry. This situation may radically change in the near future as primarily the private forests and plantation forest cultivations show higher and higher significance. Due to the cross bred species and due to intensive cultivation, this sort of raw material (for instance: black locust and poplar) has other and more favorable properties than species from natural forests have. This may expand the possibilities of wood industrial utilization of black locust. Therefore we assumed that good quality of peeled veneer and then plywood can be produced by applying manufacturing processes that were not used up to this time.

Research objectives

- I. Manufacturing peeled veneer from Black Locust (Robinia Pseudoacacia) wood material harvested in domestic plantation forests and determining its manufacturing parameters
- II. Determining strength properties of manufactured veneers
- III. Manufacturing plywood from veneers, determining of manufacturing parameters
- IV. Determining plywood's strength, biotic and weather resistant properties.
- V. Phrasing utilization advices of plywood made of black locust wood material.

Research objectives and methods

Regarding to really high strength properties of black locust wood material and to that it has excellent weather resistance as well, it was predictable it is also adequate for manufacturing plywood fulfilling high strength and weather resistant requirements. We implemented the experiment of applied technologies and its parameters with comparison of plywood made of beech and poplar wood that are generally used in our homeland. Consequently black locust wood material's excellent properties are easier to control.

First of all I dealt with manufacturing of peeled veneer at Újkígyósi Falemezgyár Bt. We developed the manufacturing parameters of 2.0 mm nominal thick peeled veneer. We tested the manufactured veneers' surface, strength and elastic properties. I stated that, black locust veneer has excellent properties like black locust wood material and it is adequate for plywood manufacturing. After our results, we aimed to manufacture high strength and weather resistant plywood. To achieve this we determined the type of applied adhesive and manufacturing parameters. Manufacturing of boards was completed in three phase (in the years of 2006, 2007, and 2008).

We investigated the boards' use of possibilities with strength and elastic tests, and with moisture resistant, fungus resistant and outdoor exposure experiments. We made the excellent (outdoor) exposure resistant board structures with hot pressing technologies contrary to cold pressing methods used up to this time.

Based on laboratory experiments we stated that the used phenol based resins' properties and qualities are playing principle role in strength-elastic moreover water and weather resistant properties. The manufactured board's quality is significantly influenced by veneers' quality. Further tests are needed to be run for precise determining effect of these factors on strength. In course of the research we have proven, board structures manufactured by ourselves are adequate for using in area of increased exposure.

Regarding to that we were first to manufacture plywood from black locust with hot pressing technology; further investigations are reasonable for continuing research activities, confirming results, determining incidental changes in technology and implementing marketing activities.

Thesis Statements

I was first to determine black locust peeled veneers' manufacturing parameters and to prepare plywood from black locust peeled veneers with hot pressing technology. I have proven high strength and weather resistant properties of black locust plywood by running strength and exposure tests.

1. I stated that good quality of black locust veneer can be manufactured with peeling technology from black locust wood material harvested primarily from plantation forest.
2. I stated that it is also possible to manufacture adequate plywood board structures for extreme exposure from black locust wood material with hot pressing technology.
3. The exposure tests have proven that properties of black locust plywood are exceedingly adequate for outdoor use as well. I have proven the high biotic resistance of black locust plywood with the fungus resistant tests.
4. Strength tests' results have proven that, in course of manufacturing of black locust plywood having high strength and weather resistant properties, adequate raw materials and supplements are required to apply.
5. I achieved the results with reduced volume of adhesive (55% of generally applied volume) by taking advantage of black locust peeled veneer and phenol based resin.

Publications related to present doctoral thesis

1. Németh József, Kovácsvölgyi Gábor, Rosta Tamás, Szabadhegyi Győző (2005) Sopron.
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2. Németh József, Kovácsvölgyi Gábor, Rosta Tamás, Szabadhegyi Győző (2005) Sopron.
A minőségi hengeresfa fahasznosítási lánc. ERDŐ-FA hasznosítás Magyarországon. Szerk. Dr. Molnár Sándor 289-297 p.
3. Németh József, Rosta Tamás, Szabadhegyi Győző (2006) Győr.
A minőségi hengeresfák és sarangolt választékok hasznosítása. Magyar Asztalos és Faipar Tudományos Melléklete.
4. Rosta Tamás (2007) Sopron.
LVL termékek gyártása eltérő sűrűségű nyár klónokból. Előadás a MTA-VEAB Soproni Tudóstársaság konferenciáján. 2007.08.29.
5. Németh József, Rosta Tamás, Szabadhegyi Győző (2007) Sopron.
Minőségi hengeresfák hasznosítása. Poszter LIGNO NOVUM – WOOD TECH szakkiállítás
6. Németh József, Rosta Tamás, Szabadhegyi Győző (2007) Sopron.
Akác fajták és klónok vizsgálata, fűrész és lemezipari hasznosítása. ERFARET kutatási jelentés. Szerk. Dr. Horváth Béla
7. Németh József, Rosta Tamás, Szabadhegyi Győző (2008) Sopron.
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