

## LIGNOVISIONEN

Schriftenreihe des Institutes für Holzforschung (ihf)  
am Department für Materialwissenschaften und Prozesstechnik (MAP)  
an der Universität für Bodenkultur Wien

Band 9

Book series of the Institute of Wood Science and Technology (ihf)  
at the Department of Material Sciences and Process Engineering (DMSP)  
at the University of Natural Resources and Applied Life Sciences, Vienna

Issue 9



## Proceedings of the COST Action E44 Conference

# Broad Spectrum Utilisation of Wood

Edited by  
Alfred Teischinger and Joris Van Acker

in Co-operation:  
COST - European Co-operation in the field of  
Scientific and Technical Research  
Action E44 - Wood Processing Strategy

### **Primary Wood Conversion Processes**

Tree Quality leads to processing trees using saw milling for timber, chipping into particles and peeling or slicing trees into veneer. Decision on selecting one of these options in respect of further processing is both related to the forest resource itself and the end products envisaged. Quality of raw materials is defining the possibilities and profitability for further processing.

### **Integrated Processing of Forest Products**

Integrated processing of forest products can use different strategies to combine primary wood conversion processing. These combinations are based on sorting and grading of logs and sawn timber but also as innovative options for secondary processing of a primary processing product.

### **Mixed Stand and Mixed Species Processing**

New forest strategy approaches will lead to more mixed stands in the future. New options for the utilisation of mixed stand and even mixed species processing will become essential.

### **Processing in Relation to Tree Dimensions and Partitioning of Trees**

Processing of small diameter logs into sawn timber components is an important topic for future economics of whole stem processing. This will also have to deal with problems induced by the presence of juvenile wood, spiral grain, reaction wood, ... Large dimension trees will deed new options for processing or as part of it and even the total tree use strategic factors in the broad spectrum utilisation of wood.

### **COST-aided**

COST is an intergovernmental European framework for international co-operation between nationally funded research activities. COST creates scientific networks and enables scientists to collaborate in a wide spectrum of activities in research and technology. COST activities are administered by the COST Office.

## Abstracts - Poster Session

### Grading standing trees based on stiffness by stress wave technique

Ferenc Divos<sup>1</sup>

<sup>1</sup> University of West Hungary, 9400 Sopron, P.O.Box 132, associate professor,  
E-Mail: divos@fmk.nyme.hu

**Keywords:** stiffness, stress wave, grading

#### ABSTRACT

Conifer species produce juvenile wood, during the first 10-20 years of their growth. This juvenile wood is characterized by higher microfibril angle in the tracheid walls comparing to "normal" wood. The compression wood has higher microfibril angle as well. The higher microfibril angle results, increased lignin, less cellulose and stiffness, strength reduction and less dimensional stability. The microfibril angle effects the stress wave velocity: higher angle results lower velocity.

A simple stress wave velocity determination in the forest parallel to the grain provides information about the quality of the wood material in a tree. High velocity indicates lower microfibril angle, longer fibers, higher strength and stiffness. The stress wave technique provides a tool for foresters to estimate the value of the wood material produced. Weyerhaeuser Company (USA) developed a "System and method for measuring stiffness in standing trees" The text in brackets is the title of a patent, invented by Chin-Linn Huang at Weyerhaeuser.

The wood NDT laboratory of University of West Hungary had a chance to test the stress wave tool: TreeSonic developed by Weyerhaeuser Co. The tool has two measuring probes and an electronic unit displays the transit time between the probes. Each probe has a 60 mm long spike for signal coupling. Using the sliding hammer driving in and out the sensor is easy. One test takes about 30 seconds. The distance between the probes is 1 meter. Stress wave is generated by hammer impact.

### Influence of compression wood on mill run of larch timber

Marco Fioravanti<sup>1</sup>, Giuseppina Di Giulio<sup>1</sup>

<sup>1</sup> DISTAF – University of Florence , Italy, E-Mail: marco.fioravanti@unifi.it

**Keywords:** List Compression wood, European larch (*Larix decidua* Mill), mill run

#### ABSTRACT

The aim of this work is to evaluate the mill run of Larch (*Larix decidua*) stems coming from two different populations representing two opposite silvicultural conditions: a planted and a naturally regenerated stand. The main aim of the experimentation has been that of assessing the impact of compression wood on the mill run. The main features that have been used for stems selection in the field have been ovality , presence of curvatures and both stem laying and taper.

## Glued laminated timber using “non traditional” species of

Castro Gaetano<sup>1</sup>, Paganini Franco<sup>2</sup>

<sup>1</sup> C.R.A. - Istituto di Sperimentazione per la Pioppicoltura (= Poplar Research Institute), strada per Frassineto 35 I-15033 Casale Monferrato (AL) – Italy. E-mail: castro@populus.it

<sup>2</sup> C.N.R. - IVALSA (= Timber Technology Institute) (retired), via Biasi 75, I-38010 San Michele all'Adige (TN) – Italy. E-mail: paganini@ivalsa.cnr.it

**Keywords:** glued laminated timber, *Populus x canadensis*, *Eucalyptus grandis*, *Abies alba*, *Larix deciduas*

### ABSTRACT

This poster summarizes the results of research conducted jointly over about ten years by IVALSA (ex-Wood Technology Institute) and ISP (Poplar Research Institute) into the possibility of using fast growing species (Poplar and Eucalyptus) for the production of glued laminated timber (glulam), by themselves or in combination with more traditional species (Spruce and Larch).

We have used the term “non-traditional” to indicate wood species not commonly used in Italy for the production of glulam for structural purposes.

The aim of the research was to find new uses for fast-growing trees (traditionally used for wood based panels) and to reduce importation of timber for glulam production.

The bonding quality proved to be reliable in all instances, including at the interface between different species, showing the possibility of using mixed beams even in severe climate conditions (e.g. EN 386, service class 3).

Choosing the species and their position in the beam with care it was possible to achieve a very high structural efficiency. Glulam elements were obtained - interesting both from an aesthetic and a mechanical point of view - using fast growing trees, which produce materials with low environmental impact, easily renewable, recyclable and manageable in the medium period.

A further advantage of mixed beams is their behaviour in bending, showing a more “ductile” rupture, if compared with the rupture of single-specie elements. This could be very useful, particularly for structural use in seismic zones.

Classification of these kinds of glulam according to the EN 1194 standard (as required by Eurocode 5) seems already possible, although in our opinion this document should be slightly modified to include lower strength classes for weaker materials too, which at the moment are excluded.

## Modelling wood utilisation for mixed broadleaved stands in Hungary

Sandor Molnar<sup>1</sup>, Robert Nemeth<sup>2</sup>, Szabolcs Koman<sup>3</sup>, Jozsef Abraham<sup>4</sup>

<sup>1</sup> University of Westhungary Institute of Wood Sciences, E-Mail: smolnar@fmk.nyme.hu

<sup>2</sup> University of Westhungary Institute of Wood Sciences, E-Mail: nemethr@fmk.nyme.hu

<sup>3</sup> University of Westhungary Institute of Wood Sciences, E-Mail: komansz@fmk.nyme.hu

<sup>4</sup> University of Westhungary Institute of Wood Sciences, E-Mail: abrahamj@fmk.nyme.hu

**Keywords:** mixed stands, broadleaved species, hardwood

### ABSTRACT

A major share, some 85%, of the Hungarian forests is covered by broadleaved species. Of these forests, the share of poplar and robinia plantations amounts to 40%. This means that over 50% of the Hungarian forests are covered by mixed hardwood species, such as beech, oak, turkey oak, hornbeam and other broadleaved species. The varying share of logs of the different species in the harvest raises a problem during wood processing. While the percentage of beech logs often amounts to about 40%, on the other hand, turkey oak and hornbeam rarely exceed 10%. Unfortunately, for logistical reasons, in these mixed stands usually the logs will not be sorted, but the whole wood material will be classified and sold as firewood. The wood utilisation models presented in this paper will show and promote more profitable uses of the wood material from mixed stands.

## Customized Wood Design of Floors

Alfred Teischinger<sup>1</sup>, Johannes Gelhart<sup>1</sup>, Manfred Gronalt<sup>2</sup>, Hans Häuslmayer<sup>2</sup>, Margareta Patzelt<sup>1</sup>

<sup>1</sup> Institute of Wood Science and Technology, BOKU - University of Natural Resources and Applied Life Sciences, Vienna, Peter-Jordan-Strasse 82, A-1190 Wien, Austria,  
E-Mail: alfred.teischinger@boku.ac.at

<sup>2</sup> Institute of Production and Logistics, BOKU – University of Natural Resources and Applied Life Sciences, Vienna, Feistmantelstrasse 4, A-1180 Wien, Austria  
E-Mail: manfred.gronalt@boku.ac.at

**Keywords:** wood quality, parquet production, colour, design, customization

### ABSTRACT

As a result of its natural origin certain properties and characteristics arise both in technical and in esthetic aspects. The unique visual appearance is given by the variety of the wood colour, the texture and other wood features such as knots. The statistical frequency of occurrence of these features and the additional features resulting from the production process (e.g. discoloration) varies. Grading standards have been developed in order to handle the various features within the process chain and the final product. The current standards do not make use of the real potential of wood as they have been made artificially.

The aim of the project "Customised Wood Design of Floors" is to provide an individual design of every floor by assembling the parquet lamellas in a certain way. It is an important requirement to define and categorise all usable wood characteristics by optoelectronic detectors which are already very reliable.

The feasibility study is carried out by laying test floors which show the true potential of the system. The aim is a customised floor design supported by a computer model which provides templates to the customer so that the customer can realize his own design. This model also has to be implemented in the process control.

The customization has to be integrated in the latest possible stage of the production which is explained in the "Product Postponement" theory. The advantage of the system is the higher value added from a low grade material and possibly fewer complaints about defects and faults of the material.

## Innovation for Beech – Project presentation

Christian Hansmann<sup>1</sup>, Ute Seeling<sup>2</sup>, Robert Stingl<sup>1</sup>

<sup>1</sup> Institute of Wood Science and Technology, BOKU - University of Natural Resources and Applied Life Sciences, Vienna, Peter-Jordan-Straße 82, 1190 Wien, Austria,  
E-Mail: hansmann@boku.ac.at

<sup>2</sup> Institute of Forest Utilization and Work Science, Albert-Ludwigs-Universität Freiburg im Breisgau, Werderring 6, 79085 Freiburg, Germany, E-Mail: ute.seeling@fobawi.uni-freiburg.de

**Keywords:** beech, red heartwood, grading, steaming, drying, UV-treatment, colour, construction

### ABSTRACT

For the European Beech wood resource the inhomogeneous discoloration red heartwood (red core) is very common. Red heartwood significantly restricts the log quality of beech stems and end products and leads therefore to severe economic losses. The objectives of the EU-project "Innovative solutions for improved processing of Beech (*Fagus sylvatica* L.) with red heartwood" are to optimise the processing of beech logs containing red heartwood, to develop grading devices for red heartwood timber, to align and stabilise the wood colour by means of adequate steaming and drying schedules and UV-treatment and to develop high-value products of red heartwood.

The project work will start with an international survey on existing technologies, processing methods and products relevant for the project. Based on this the partners will agree the fine-tuning of the industrial trials, done by the SME's with support of the RTD-performers, and of the additional measurements in the laboratories. The strategy is on the one hand to increase the yield of the valuable light beech wood by optimising the sawing of round timber containing red heartwood and by automated grading, using a prototype optoelectronic system. On the other hand, methods for increasing the added value for red heartwood products shall be developed; for example by homogenising the appearance by adapted and optimised steaming and drying schedules as well as by UV-treatment. Doing so innovative products of red heartwood will be developed focussing on thermal treated wood, glue-lam beams and furniture and their market potential will be assessed. By combining the results, an integrated concept to process beech logs containing red heartwood with special regard to feasibility, risks, costs, profit and energy input will be developed and will be disseminated to SME's and interested bodies in Europe.

## Evolution of the European poplar wood market

Rossen Novakov<sup>1</sup>, Patrick Mertens<sup>2</sup>

<sup>1</sup> Rue Sainte Adèle 21, 5030 Gembloux, Belgium, Faculté Universitaire des Sciences Agronomiques de Gembloux (FUSAGx), E-Mail: novakov.r@fsagx.ac.be

<sup>2</sup> Avenue Maréchal Juin 23, 5030 Gembloux, Belgium, Centre de Recherche de la Nature, des Forêts et du Bois (CRNFB), E-Mail: P.Mertens@mrw.wallonie.be

**Keywords:** poplar, market, transport, wood processing industry

### ABSTRACT

The poplar culture is of an important and still growing interest for the wood processing industry in Europe. The 5 major poplar producing countries in Europe (France, Hungary, Italy, Spain and Belgium) account for 650 000 ha of plantations yielding annually over 5 430 000 m<sup>3</sup> of round wood. Compared to the traditional silviculture it has the advantage to quickly adapt itself to the demand and supply an inexpensive, homogenous and renewable raw material for a large variety of end products.

Unfortunately, the actual situation of the poplar culture and the poplar market in Europe is unstable. In many regions throughout Europe the local availability of poplar wood can not satisfy the demand in quantity, quality or both. Or, on the contrary, in other regions the resource is abundant but the poplar processing industry is located far away. Therefore, long distance transport of roundwood poplar timber has become frequent for the poplar processing units in need for sufficient and regular supply of wood. The actual price of the road and railway transport is still low enough to allow these long-distance supplies of raw material without any added value. However the prices of fossil fuel are steadily increasing and the situation is certainly going to change. In addition, the labour costs in western European countries are also increasing and together with the transport costs this could lead to elimination of the current poplar processing industry. New wood processing technologies are focussing on decreasing the production costs but it is not certain whether they can compensate for the increased transport and labour costs.

The enlargement of the European Union adds an additional dimension to this problematic. The new EU member countries should be certainly taken into account as some of them are already main actors in the poplar related industry in Europe.

All this is just a small part of the uncertainties concerning the poplar culture and the poplar industry on the continent. Europe needs a new strategy which will help us to overcome the inevitable difficulties coming soon.

Having done the actual state of the international wood market, we have to integrate the social and economic constraints which become stronger and stronger. In that relation, poplar can serve as an example in that kind of macroeconomic approach.

# Impressum / Imprint

Verleger / Publisher:	Universität für Bodenkultur Wien University of Natural Resources and Applied Life Sciences, Vienna
Herausgeber / Editor:	Alfred Teischinger
Redaktion / Editorial office:	Robert Stingl  Institut für Holzforschung (ihf) am Department für Materialwissenschaften und Prozesstechnik (MAP) an der Universität für Bodenkultur Wien  Institute of Wood Science and Technology (ihf) - Department of Material Sciences and Process Engineering (DMSP), University of Natural Resources and Applied Life Sciences, Vienna
in Co-operation:	COST - European Co-operation in the field of Scientific and Technical Research Domain: Forests and Forestry Products Action E44 - Wood Processing Strategy Chairman: Joris Van Acker
Adresse / Address:	Peter Jordan Straße 82 A - 1190 Wien (Vienna), Austria
Telefon / Telephone: FAX / Telefax:	+43 – (0)1 – 74654 – 4250 +43 – (0)1 – 47654 – 4295
E-mail: Internet:	ihf@mail.boku.ac.at www.boku.ac.at/holzforschung

# Bestellung / Order Form

LIGNOVISIONEN Band 9 / Issue 9



## Proceedings of the COST Action E44 Conference Broad Spectrum Utilisation of Wood

June 14th - 15th 2005; BOKU Vienna, Austria

Edited by Alfred Teischinger and Joris Van Acker

ca. 210 Seiten (A4) / Pages (size A4)

Text and Summary: in englischer Sprache / in English language

### Primary Wood Conversion Processes

### Integrated Processing of Forest Products

### Mixed Stand and Mixed Species Processing

### Processing in Relation to Tree Dimensions and Partitioning of Trees

An die

Universität für Bodenkultur Wien  
Institutes für Holzforschung (ihf)  
am Department für Materialwissenschaften und Prozesstechnik (MAP)  
Peter Jordan Straße 82  
A-1190 Wien (Vienna), Austria

Tel: +43 (0) 1 47654 4250  
Fax: +43 (0) 1 47654 4295

Ich/Wir bestelle(n) ..... Exemplar(e) der Serie LIGNOVISIONEN Band 9

I/We order ..... copy(ies) of the book series LIGNOVISIONEN Issue 9

Preis / price € 32.-- (plus Versandkosten / plus mailing costs)

Titel, Vorname /  
Degree, First Name .....

Nachname /  
Surname .....

Firma oder Institut /  
Company or Institute .....

Adresse / Adress .....

UID-Nr. / VAT-Nr. ....

Email .....

Anmerkung / Remark .....

.....  
Datum / Date

.....  
Unterschrift / Signature