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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.

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Introduction - LIGNOVISIONEN Issue 9

Forestry – wood industry in Europe: opportunities and constraints

Far more than generally perceived the forestry – wood industry chain is nowadays based on the changing societal and economical elements in Europe. Increased knowledge on this is required to be able to define options and to stimulate discussion on issues related to forestry and the wood industry. A wood processing strategy should be based on opportunities and constraints in order to match the goals and requirements of long term forestry with the initiatives from the forest products industry.

Geographically the forestry – wood industry chain is not uniform over the European continent. Major tree species differ based on the natural forest types established since the last glacial period. From these differences, *e.g.* between coniferous and broadleaved species, an adapted processing industry has evolved. Additionally the wood industry has been influenced by the evolution in wood processing technology used.

Total usage wood industry

There is clearly a shift towards wood processing with lower requirements for to specific species or tree quality. Increased importance of the pulp and paper sector in the overall picture includes considering strategies of full forest utilisation for one product type. Biomass for energy clearly evolves from the usage of wood residues and recovered wood towards direct impact on forest management. As such this use for energy will induce competition for resources by the pulp and paper sector as well as the wood based panel sector. Production methods for wood based panels like chipboard and to a certain extent also MDF and OSB, are nowadays lower in specificity than a few decades ago. This evolution is clearly also influenced by renewed interest in bio-energy (new biomass-based electricity plants in Germany) and new developments like the production of wood plastic composites (products now showing important market potential in North America). The wood industry is becoming increasingly independent from the local forestry species and is now mainly located where consumption is high. The impact of material recovering and recycling activities on the geographical distribution of biomass based electricity plants, chipboard plants and paper mills focussed on recycled fibre is relevant in this respect.

Local industry linked to forest types

Contrary to the primary wood conversion processes mentioned in the previous paragraph which are based on chipping of particles, the milling for solid timber and peeling or slicing for veneers is directly linked to the forest types present. In general, sawn wood products for construction are based on softwoods while many furniture, exterior joinery and decking applications involve the use of local or imported hardwood species from temperate and tropical forests. Higher quality requirements not only relate to specific wood species but also focus on quality trees coming from fully developed 'climax' forests. The primary wood conversion process can be simple, *e.g.* for utility poles, posts, railway sleepers or require low overall quality, *e.g.* for packaging or fencing products, but can however also involve a very selective grading of trees and logs for *e.g.* veneer based products. Rotary cut veneer for plywood and sliced decorative veneer have always created extra opportunities for quality based management of specific tree species or even of individual trees in local forests. Besides veneer production another typical example of a high quality application is the oak forestry – wood industry chain for the production of wine barrels in France using merrain quality.

Changing forests

New forest strategy approaches lead to the higher usage of local tree species and more mixed stands. Increasingly, important forest areas are dedicated to landscape development, nature reserves and protected species. The increased emphasis on hardwood species creates extra opportunities but will inevitably also require more skills and management to obtain sufficient tree quality for the production of suitable sawn wood (defect free for many applications) and veneer production. Higher costs of both investments and salaries may not be compatible with the need for additional selective thinnings, pruning and forest friendly exploitation techniques. Increasingly mixed forests combined with low level of tree quality management could limit the usage to solely primary conversion based on chipping. This strategy is suitable for some parts of the wood industry but could decrease the potential of future forestry in Europe.

Alternative lignocellulosic materials

Wood production is no longer the prime objective in several European forests. However, the increased need for lignocellulosic material for the production of pulp and paper, wood based panels and bioenergy is present. A wood processing strategy might require a closer look at raw material not only coming from 'natural' forests. In addition to sustainable forest management based on principles respecting ecosystem development, there is a possibility to lower the pressure in wood volume production by these forests by allocating this functionality to man-made forests and additional input from the agricultural sector. The basic idea to create a sustainable production of lignocellulosic material can partly relate to plantation timber from poplar, eucalyptus and robinia (black locust) or highly volume based coniferous forest products *e.g.* based on Sitka spruce. From the agricultural sector sustainable production of miscanthus, willow coppice, wheat straw or even bamboo are potential options. Focus should not only be on *e.g.* energy crops, as recycling and recovering of all lignocellulosic material also needs to be addressed.

In conclusion, it can be stated that forestry should work towards more quality trees in order to guarantee sustainability both based on a larger scale ecosystem linked approach as well as on the local societal and economical background. The conversion of wood by means of chipping into particles should continue to focus on the use of secondary forest products like thinnings or top end logs. However an increased support for the use of recovered and recycled products as well as promoting man-made forests (tree plantations), partly based on the potential of the agricultural sector, might contribute to the development of a sustainable forestry – wood industry chain in Europe.

This conference of the COST Action E44 'Wood Processing Strategy' on the "Broad spectrum utilisation of wood" is providing information on the above mentioned elements with special emphasis on the following 4 topics:

Primary Wood Conversion Processes

Tree quality has a major effect on which primary processing strategies (milling for solid timber, chipping for particles and peeling or slicing for veneers) are selected. Decisions on selecting one of these options in respect of further processing, is related to the forest resource itself and the end products envisaged. The quality of the raw material is paramount when defining the possibilities and profitability for further processing.

Integrated Processing of Forest Products

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

Mixed Stand & 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 the future economics of whole stem processing. This process will also raise problems with the presence of juvenile wood, spiral grain and reaction wood. Large dimension trees will also need new options for processing. The partitioning of trees, both prior to or during the processing process and even the total tree use are strategic factors in the broad spectrum utilisation of wood.

Joris Van Acker
Chairman COST Action E 44

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