The Varma Project

Value added by optimal wood raw material allocation & processing

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The changing face of the wood industry in Europe meant that a lot of work has been done to better understand the most effective wood supply, sawmill operation and logistics chain to maximise profitability in the industry. Working with the industry, the researchers of the VARMA project are looking to find new ways to increase cost competitiveness through better understanding of customer needs and a more effective networking structure.

Wood Allocation Centre (WAC) – networking, streamlining, optimization

Solutions for the challenge are sought through Wood allocation centre – a concept proposed at the VARMA project with following objectives:

1. Introduction of radically novel customer-oriented business models and services
2. Higher wood raw material utilisation ratio and improved value yield
3. Means for increased cooperation (i.e. flexibility and efficiency) via networking within wood value chains.

The project goal is to develop a customer-driven value chains and wood raw material allocation system by implementing a smart bucking center for stems.

Originating from different national needs, the business concept for a WAC is being developed in Finland, Germany, the UK and France by 12 partners from the industry and research organisations. The WAC can be either a virtual entity or a physical structure (ie organisation or facility), where logs are cut to length according to customers' (eg sawmills, plywood mills) needs.

Differences in regional situations cause different (regional) demands and different strategies to establish WAC. One of the key aspects to ensuring optimisation of wood raw material resources is to get pre-information of stand properties, where promising research results can be expected. New technologies, however, are only one aspect in overcoming bottlenecks in the wood supply chain. Organisational and/or informational aspects are important too, by designing wood value chain networks around the WAC, as well as new services to support efficient raw material supply and value creation.

The WAC use indicators that can be described and assessed and which, when observed periodically, can be useful in identifying trends. The indicators are wood value, product priority, demand issues, wood availability, harvest costs, extraction factors, haulage and stacking room.

Information flows within the wood value chain can be improved by analysing demand specifications for data and knowledge between harvesting and sawmill.

The UK's case study is looking at timelines before and after the harvesting operations have started, to ensure that the maximum advantage comes to the grower or forest owner and the buyer, the saw miller.

The industry can do this by 3D scanning the forest to ensure we can capture the attributes of the harvest area, and using 3D stem profiling and simulation cutting to understand what can be cut. This is taken into account during harvest operations and utilised to maximise the value dependent on the market at that time.

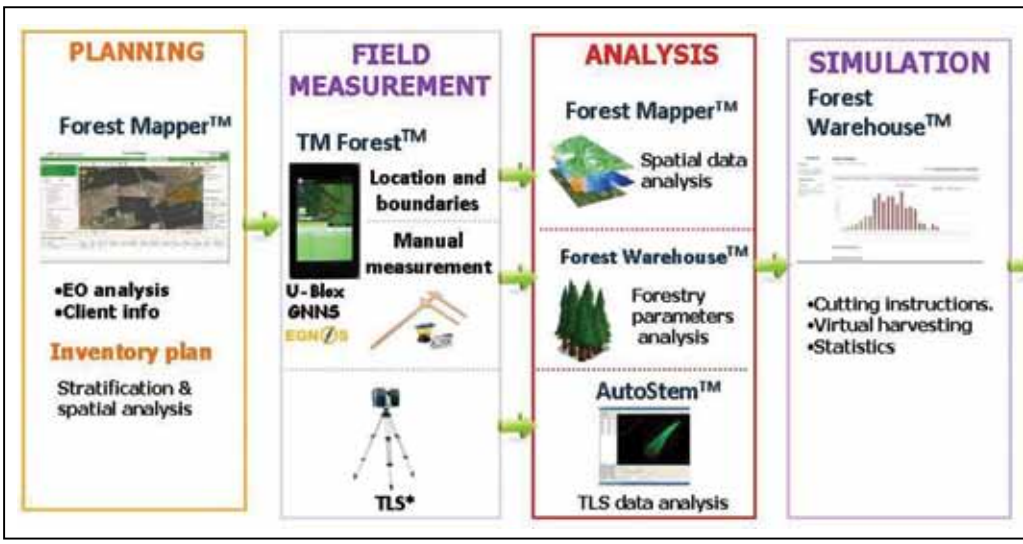
Methodology and approach

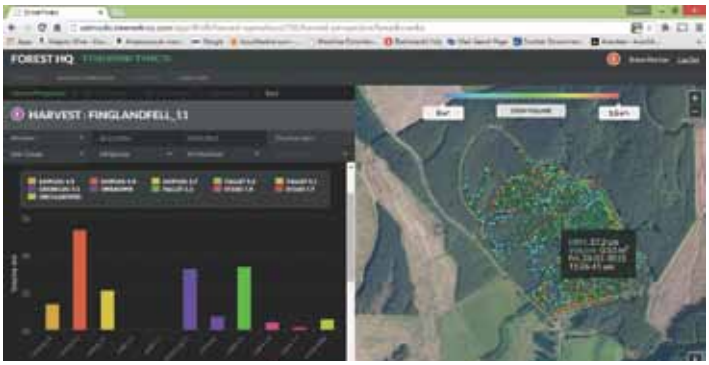
Understanding the process flows allow for better understanding of the value chain, how it is constructed and where weaknesses can arise or be shown. See Typical workflow diagram.

Using various new technologies including laser tree scanning to increase knowledge of the forest resource and carrying this forward to each stage of the process, we can maintain and improve the value of wood supply by directing products to the most appropriate end users. Monitoring of these systems can be undertaken by use of simple and novel satellite systems such as Real Time Forest Intelligence (RTFI).

The RTFI Web interface system allows for users to monitor the cut to length harvesting machines individually or collectively. Crop yield and the actual harvest machine production are available for analysis off site in 'real time'. The harvest manager can send instruction files to the harvester machines In Vehicle Device (IVD) so that the machine operator knows what work needs to be done at that time. The CTL harvester machine data is available as it cuts the trees, which means that the forest owner or harvest manager can always have a steady flow of information from the harvester machine. The generation of reports on the yield performance of the CTL harvester machine via web-based GUI helps to streamline the process and bring even further efficiencies.

Understanding the forest to be felled in all





Left: The RTFI Web interface system allows for users to monitor the cut to length harvesting machines individually or collectively.

Above: Real-time monitoring of harvesting

Below: Typical workflow

aspects of potential breakout as and when the harvest operation takes place is vital to improve the versatility of the stand and current markets, which in turn includes the sawmill stocks and customer demands.

Knowing the value within the forest using technology (linked to the stem file data within each harvester) offers more flexibility and control in how managers can use the data and, more importantly, the timber.

Real-time monitoring of harvesting

The advantage of this is effective control by harvesting managers giving a better understanding of products cut to suit the markets and of waste element for each forest; this allows for better use of the right machine for the right harvesting operation.

Seeing the location and breakout of different species can also aid in the management process by pre-planning operations in relation to the market demands for species and log products. The additional information in the process of the gives more flexibility as to what can or should be cut, dependant on market demand.

Being able to adjust to the market is imperative to maximise the wood value. Being able to see changes in the market and adapt within a day is important to all parts of the supply chain within the wood market.

The figure below shows change in cutting pattern for one product to swap to another. The specific date shows that 4.9m logs were stopped due to a lack of demand and 4.3m logs were cut. The data gave the sawmill the flexibility to see stock control in the forest and in the sawmill.

Opportunities for the UK sawmilling sector

The UK sawmill industry has developed significantly in the last ten years, with the principal players developing high-value processing units thus maximising yields from short-log harvesting systems. Changes in timber quality, a consolidation towards Sitka spruce and the high demand for wood has forced the sawmill sector to use as much technical advantage as it can find, in order to maximise the utilisation and yield recovery from each log cut.

The issue is with the quality of logs being grown and sawn in the UK. With premature harvesting to meet the current demands and achieve forest rationalisation, the log quality appears to be poorer than in earlier years. New technology in the value chain would allow for better decision-making, giving potentially more opportunities to maximise value from the forest . The sector needs to be able to react with more efficiency to allow for less waste and more productivity, not just at the mill but through the log supply to the mill. Forest growers demand more money for their timber which increases the overall market price for wood as, in turn, the mills seek new markets to maximise their returns.

New methods in determining how we understand the resource and harvest in a more proactive way at each stage is vital to keep in touch with changes in customer (growers and buyers) demands. Being able to understand the forest and accurately predict the log breakout with harvesting operation control in real time can improve the value chain within any EU country.

LETTER

Technology in the forest

I was most interested by the North-Rhine Westphalia "Der Virtuelle Wald" project as detailed in the October issue of FTN. This overall approach is one which has much to recommend it in the context of enhanced current and future British forestry practice. In particular, it will support modelling and interpretation of the outcomes of major changes to species selection and silvicultural systems that are required to convert currently immature British plantation forest resources to a more sustainable and resilient long-term basis. Virtual forestry will complement the role of shorter-term operational field trials, while providing 'advance intelligence' of the likely results from longer-term experiments, where these are instigated.

Responses published in the October issue rightly point out that this is a more detailed and intensive approach to forest management than we have been used to in Britain recently, and that this brings with it the likelihood of additional costs. In the short-medium term this can be accommodated by only applying modelling and visualization tools to a suite of exemplar 'virtual demonstration forests' representing broad classes of the overall resource - plantation Sitka, native pinewood, mixed conifers etc. Modelling environments now required embrace climate and soils, pests, silviculture, yield, carbon, harvesting, economics and finance, biodiversity, landscape and social benefits. Outputs can be extrapolated onto wider classes of forest resources with an intermediate level of site data collection and calibration required.

Whether bespoke application of virtual forestry techniques to all holdings (including 'midget forests'!) is necessary is a moot point. However, in the longer term we should all recognise that we need to "raise our forestry game" towards that of our German counterparts, putting in place the necessary higher standards of survey enumeration, mensuration, monitoring and precision silviculture. While this may incur costs for initial installation and repeat surveys, these are prerequisites for any truly sustainable multi-rotational forest management. In truth, we are seriously under-investing at present, not least in our forestry education and training.

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