

Focus on Forestry and Forest Products Research Centre

CSIR Natural Resources
and the
Environment
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The Forestry and Forest Products (FFP) research centre is a leading provider of research, services and software products for plantation forestry and forest products industries in southern Africa and worldwide.

The Centre is a joint venture between the CSIR Natural Resources and the Environment unit and the University of KwaZulu-Natal (UKZN).

The objective of the centre is to develop and align both contract and postgraduate research activities with the forestry and forest products sector's needs. In the process, the FFP centre plays a key role in the development of forestry and forest products research competence in South Africa.

The centre's focus lies in maximising value extraction for plantation-grown softwoods and hardwoods, within the pulp and paper processing industry and the plantation growing industries that support it. This is achieved through:

- Aligning research strategy and activities with market needs
- Improving knowledge of the forest resource, and its impact on processing operations through scientifically excellent research and development
- Transferring knowledge to the market through innovative solutions.

Services

The FFP centre's research focus is on wood quality research, solid wood processing and pulp and paper technology, including:

- **Remote sensing**, supporting forestry aspects such as forest ecology, forest mensuration, estate management and resource management.
- **Resource evaluation**, i.e. to understand resource characteristics, process constraints and market needs. Tools and techniques include the:
 - » Pre-harvest quality assessment (PHQA) software system
 - » Near-infrared absorption (NIRA) to measure chemical constituents in wood and image analysis
 - » Densitometry to measure physical wood characteristics.
- **Wood properties**, i.e.
 - » Wood screening (near-infrared absorption (NIRA) spectroscopy, densitometry and image analysis)
 - » Wood and fibre chemical characteristics
 - » Wood properties database
 - » Wood samples



• Pulp and paper analysis

The FFP centre's pulp and paper laboratory is an internationally ISO accredited laboratory and comprises:

- » Saws, chippers, hammer and Wiley mills for sample preparation
- » Four pulping digesters for the processing of chemical pulp
- » Two papermaking machines for the manufacture of pulp hand sheets for evaluation of physical strength properties.

The laboratory is also equipped with a variety of instruments for pulp evaluation, strength testing, surface testing and physical testing, and can carry out analysis on pulp and black liquor for active alkali content and kappa number.

• Software and database development

Software products (Figure 1) include:

- » Sawmill simulation
- » Production planning.

designed to run off graded plantation data sets, such as spatial coverages and the annual plans of operation.

SIMSAW 6 simulates the sawing process in a sawmill and predicts the board recovery and the total recovery by value and volume, based on specified inputs such as sawing machines and sawing patterns used. A unique feature is its ability to simulate log quality in terms of knotty defect core and the board grades resulting from each log and production scenario.

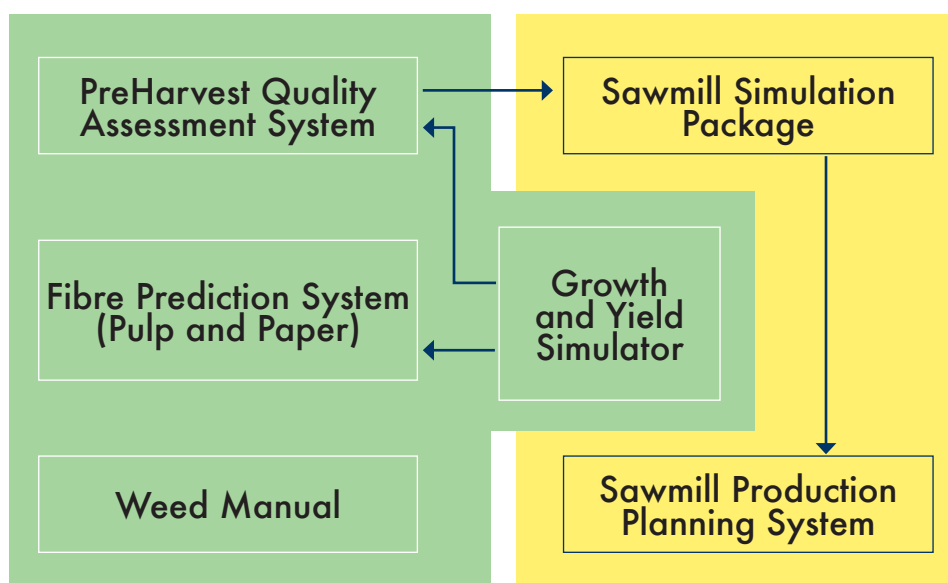


Figure 1

Pre-harvest quality assessment system.

This product is aimed at calculating the defect core of a pruned stand. It can also be used to evaluate the presence of other characteristics that affect quality, including resin cracks, resin pockets and compression wood.

The GIS fibre prediction system

(FPS) allows managers to determine the optimal harvesting plan based on wood anatomical properties. The system, which runs under ESRI's ArcView™ system, is

The sawmill production planning system (SPPS)

essentially needs three inputs i.e. the resource (logs), the market demand (orders) and the sawmill's production capabilities. A computer model then finds the optimal production solution, which maximises profit while maintaining the resource, demand and production constraints. It also provides the financial impact of different production, demand and supply scenarios.

Projects

Current FFP centre projects include:

- Evaluation of airborne laser scanning technology (LIDAR) for the determination of tree height, biomass and species discrimination
- Calibration and validation of a process-based forest growth model running off spatial information obtained from Landsat data
- Evaluation of vegetation indices for South African forests in order to optimise the relationship between remote sensing data and forest parameters such as LAI, biomass and specific leaf area.

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