New Virtual tools for Effective Planning and Training

The renewal of the forest environment is a slow process. The changes that result from timber harvesting are long lasting, and for this reason, the impact of logging operations should be carefully weighed and planned beforehand. The same applies to Operator training, which should be as safe and effective as possible.

Two Timberjack Simulators have been designed in response to these needs:

* The Landscape Simulator is an efficient tool for planning logging operations and creating virtual images of the impact of harvesting on the forest landscape -- even over the long term.

* The Harvester Simulator is a state-of-the-art tool for Operator training -- from basic to advanced skill levels. Simulator training is safe, efficient and cost-effective.

LANDSCAPE SIMULATOR

The landscape Simulator is a soft-ware package that automatically creates a three-dimensional virtual landscape by applying digital map information and forestry databases.

The Simulator allows unrestricted movement and harvesting operations in the landscape, which can be viewed from different perspectives and altitudes.

Several tools are available for modifying the landscape. The user can accurately mark off the site to be harvested and freely define the type and extent of the operation. The forest is portrayed utilizing photo-quality trees, so the virtual landscape is extremely lifelike.

The Landscape Simulator is a tactical and operational planning tool that provides immediate visual response, allowing users to plan the best harvesting option.
In this way, the impact on the landscape can be analyzed before the actual felling. If the user’s GIS system includes growth models, the landscape can even be visualized over time, to show the long-term impact of harvesting operations.

**Applications of the Landscape Simulator**

* Create virtual visual landscapes of a desired area
* Evaluate the landscape from various perspectives
* Evaluate how alternative harvesting operations will affect the landscape
* Visualize the change in the landscape according to specified parameters over a given period of time

**HARVESTER SIMULATOR**

Today’s CTL Harvesters represent state-of-the-art technology and require many special skills from Operators. In addition to excellent hand-eye coordination, the Operators have to know forestry and even computer technology. Their mechanical skills must also be excellent, and they must increasingly participate in the planning of harvesting operations.

Not surprisingly, it takes a lot of practice to acquire the necessary knowhow and skills and develop the right ‘touch’ for the job.

In an industry first, Timberjack’s new Harvester Simulator uses virtual reality in training. The system accurately simulates both the working environment and machine functions, providing an effective tool for Operator training. Harvesting conditions and other parameters can be specified, and the Simulator also produces reports to help identify the trainees’ strong points and weaknesses.

The Harvester Simulator is based on the Landscape Simulator, so it offers almost unlimited possibilities for designing operating environments. The Harvester Simulator can also be used to design the strip road network and even tree marking. The actual operation is based on accurate machine modeling and a versatile easy-to-expand virtual system. A modular structure makes it possible to adapt the Simulator to new machine models.

**Wide-ranging advantages of Simulator Training**

By using a Simulator for training, realistic working conditions can be created. To keep the trainees’ level of motivation high, the Simulator is equipped with actual machine controls, including a complete Timberjack 3000 measuring and control system, and the machine functions and interaction with the environment have been modeled to be as real as possible.
The control settings for various machine functions can be changed as desired, and visual feedback, sound effects and animation also contribute to the effectiveness of virtual training.

Increased safety is another advantage. The Simulator helps avoid the damage that inexperienced Operators can cause to both the forest and the machine. Through Simulator training, Operators can become familiar with the basic machine functions before they start working with a real machine.

The Simulator also provides detailed reports on the training session through ‘Simulog’. The total training time is automatically divided into segments specifying the use of different machine components and the time spent on machine travel, crane operation and timber processing. Production volumes can be monitored in real time, as well as the amount of waste due to high stumps or small tree diameters. In addition to numerical statistics, the Harvester Simulator also makes it possible to ‘fly’ over the harvested site for an aerial view of the operations.

To ensure continuity in Simulator training, the collected data can be saved and restarted later. This also encourages self-learning, even at the beginning of the learning curve. Feedback is another important advantage. The Simulator provides detailed information about the time used for different functions, as well as enabling objective comparisons between the trainees. Results can be measured in terms of costs and quality, and the same situation can be repeated at different machine settings.

The capital and operating costs of Simulator training are comparatively low. There is no need for special service or transportation facilities, and the actual machines are freed for productive work.

**Landscape Simulator Components**

**Required databases and libraries**

- Tree height model
- Waterways, roads and buildings
- Forest resource information
- Object library (trees, subvegetation, buildings and other fixed objects)

**Adjustable parameters**

- Observation point (location, height)
- Time of year
- Direction of view
• Time of day
• Angle of view
• Weather conditions

The Landscape Simulator is based on a VLG (Virtual Landscape Generator) developed by Instrumentointi Oy.

Harvester Simulator Components

Real machine controls and other equipment

• Harvester Operator seat
• Joy stick controls and keypads
• Compete Timberjack 3000 Measuring and Control System
• Can be installed in an actual Harvester cab

Special training tools

• Landscape generator (terrain, underbrush, stand characteristics)
• Design tools to mark the preferred strip road network
• Tree marking capability to simulate thinning prescriptions

Low investment and running costs

• Based on Personal Computer technology
• Low maintenance costs
• Low operating costs

No garages or transport equipment is needed because the virtual terrain is created at the training facility.

The visual system was developed by Instrumentointi Oy.

The Landscape and Harvester Simulators were designed by Plustech Oy, a Timberjack affiliate company specializing in advanced long-range product development. Plustech Oy is part of Timberjack’s European R&D Center in Tampere, Finland.