Orange Tree Technologies

## FinScan Article

# FinScan handles high-speed timber inspection data with Gigabit Ethernet module

## Automated timber inspection

In the timber industry, being able to inspect wood quickly and accurately is vital. A good inspection system can increase the value of the sawmill's output, and can optimise production and boost throughput.

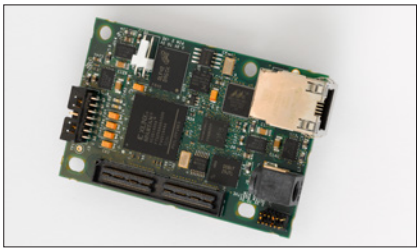
By automatically grading the timber and spotting imperfections such as knots and holes, the system reduces human error, and achieves consistent quality. Studies have shown that an automatic system can achieve between 96% and 99% of the theoretical maximum yield, or financial value of the timber, compared to typically 80% to 85% from manual sorting.

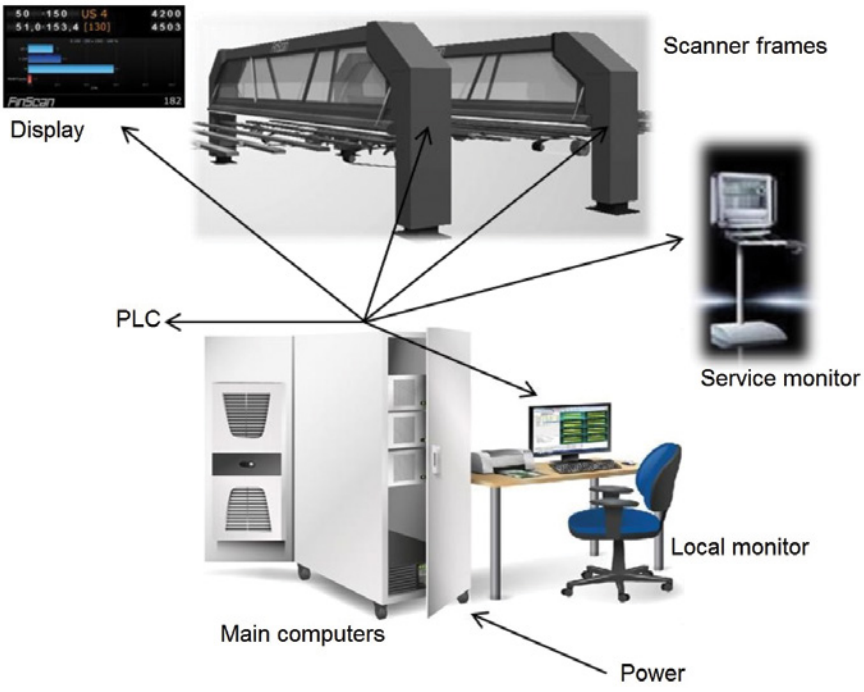
FinScan is a Finnish company that makes intelligent grading systems that meet this challenge. Its BoardMasterNOVA system scans a board from ten different angles, and includes anywhere between six and eighteen HD matrix cameras to capture the most detail. High-speed industrial computers are used to process the data, with one computer handling up to six cameras.

In operation, the cameras are used in a high-speed linescan mode – capturing a one-dimensional image 2,000 times per second as the timber moves past on a conveyor belt. An encoder records the movement of the conveyor, and its data is used to recombine the line camera data to reconstruct a complete 2D image in the computer.

## High speed data transfer

With so much data generated, FinScan needs a high-performance interface between cameras and computers. To solve this problem, it uses the ZestET1 Gigabit Ethernet FPGA module from Orange Tree Technologies. The module's compact size means it is easy to integrate within the scanner system.






Orange Tree Technologies Ltd
**The board-level embedded hardware and software solutions company**
www.orangetreetech.com

Tel +44 1235 838646
Email: info@orangetreetech.com

# Orange Tree Technologies

"The camera system is built around the ZestET1 module," explains Julius Wilkko, electronics designer at FinScan. "We've used ZestET1 since 2009 – before that, we had our own specialised interface."

FinScan takes advantage of ZestET1's high bandwidth to move the high-resolution image data quickly to the system's computers, as well as transferring data from encoders and thickness meters. With the main processing engine implemented in ZestET1's hardware, sustained data rates over 100MBytes/sec can be achieved, and latency is only 6µsec.

Wilkko says, "We have to scan things very fast: the faster we scan, the better the images, and thus the more defects we can find on the board."

## Saving development time

"We chose ZestET1 because it contained everything we needed, and includes a big user FPGA so we could develop our program on it," says Wilkko. "We didn't need to add any extra logic – we have the complete system in one package."

ZestET1 includes Orange Tree's proprietary GigExpedite chip "GigEx". This is a TCP/IP Offload Engine (TOE) that handles all Ethernet communications protocols, which means that the module's Spartan-3A FPGA* is left completely free for the user's application. It also means the user requires no knowledge of Ethernet protocols.

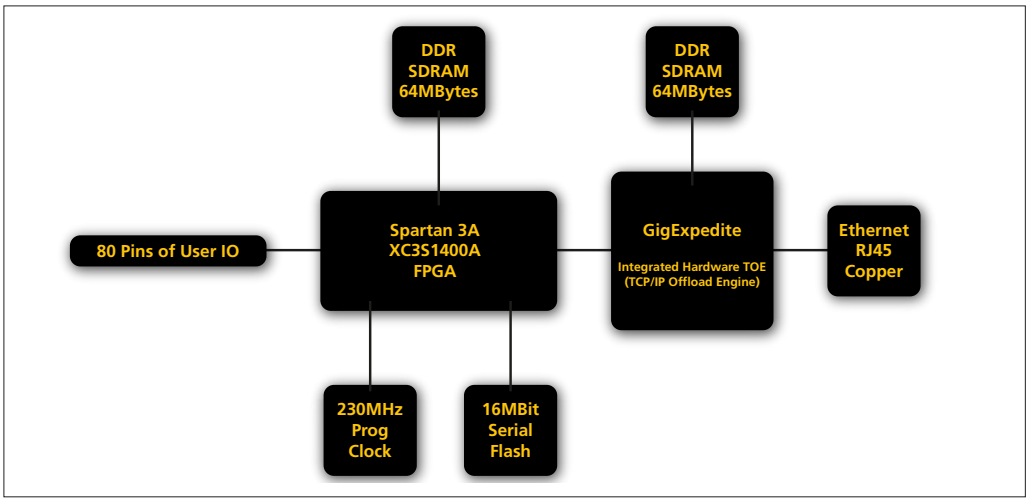
"Having a ready-made solution minimises electrical design on our part, and makes development of the product much faster," continues Wilkko. "We didn't have to go into new design processes that we had no experience of – we just checked we had sufficient I/O and speed, and we were good to go."

## Reliable solution

According to Wilkko, the module has been reliable, and support from Orange Tree has been helpful. In particular, the software provided with ZestET1 (including example host and FPGA code) has helped FinScan develop its applications, and Wilkko comments, "Orange Tree provided wrapper code for handling data transmission, which made the process of creating our program much easier."

Wilkko concludes, "Overall, ZestET1 has been a very robust and capable module, and we have been very happy with it."

**As well as ZestET1, Orange Tree now offers the ZestET2-J and ZestET2-NJ modules, with an Artix-7 user-programmable FPGA.*




**Overview:**

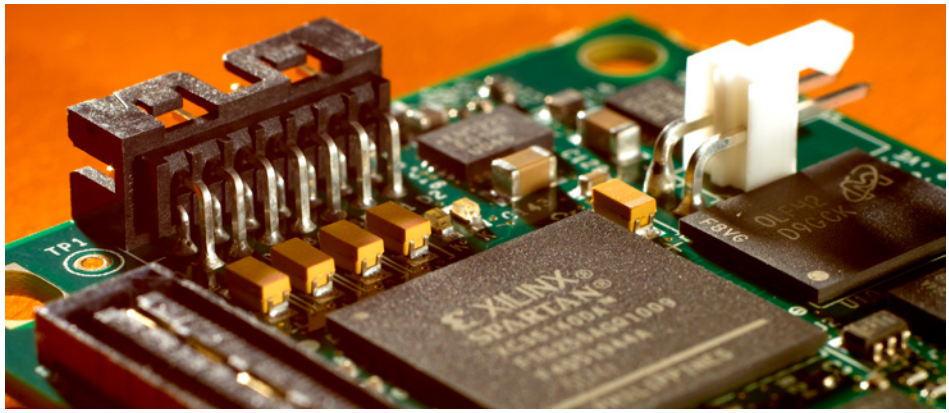
For its timber inspection systems, FinScan chose the ZestET1 Gigabit Ethernet FPGA module. This provides a fast, reliable interface between high-speed cameras and computers. The module's built-in TCP/IP Offload Engine (TOE) has minimised the design work needed by FinScan, and saved it development time.

**Key benefits:**

- Enabled high-speed data transfer at sustained 100MBytes/sec bandwidth – improving inspection quality.
- Saved development time, due to Ethernet protocols handled by on-board GigEx TOE.
- Provided reliable, proven solution, backed up with extensive software support.

**Customer at a glance:**

Industry: machine vision
Location: Finland
Founded: 1988




Orange Tree Technologies Ltd
**The board-level embedded hardware and software solutions company**
**www.orangetreetech.com**
Tel +44 1235 838646
Email: info@orangetreetech.com