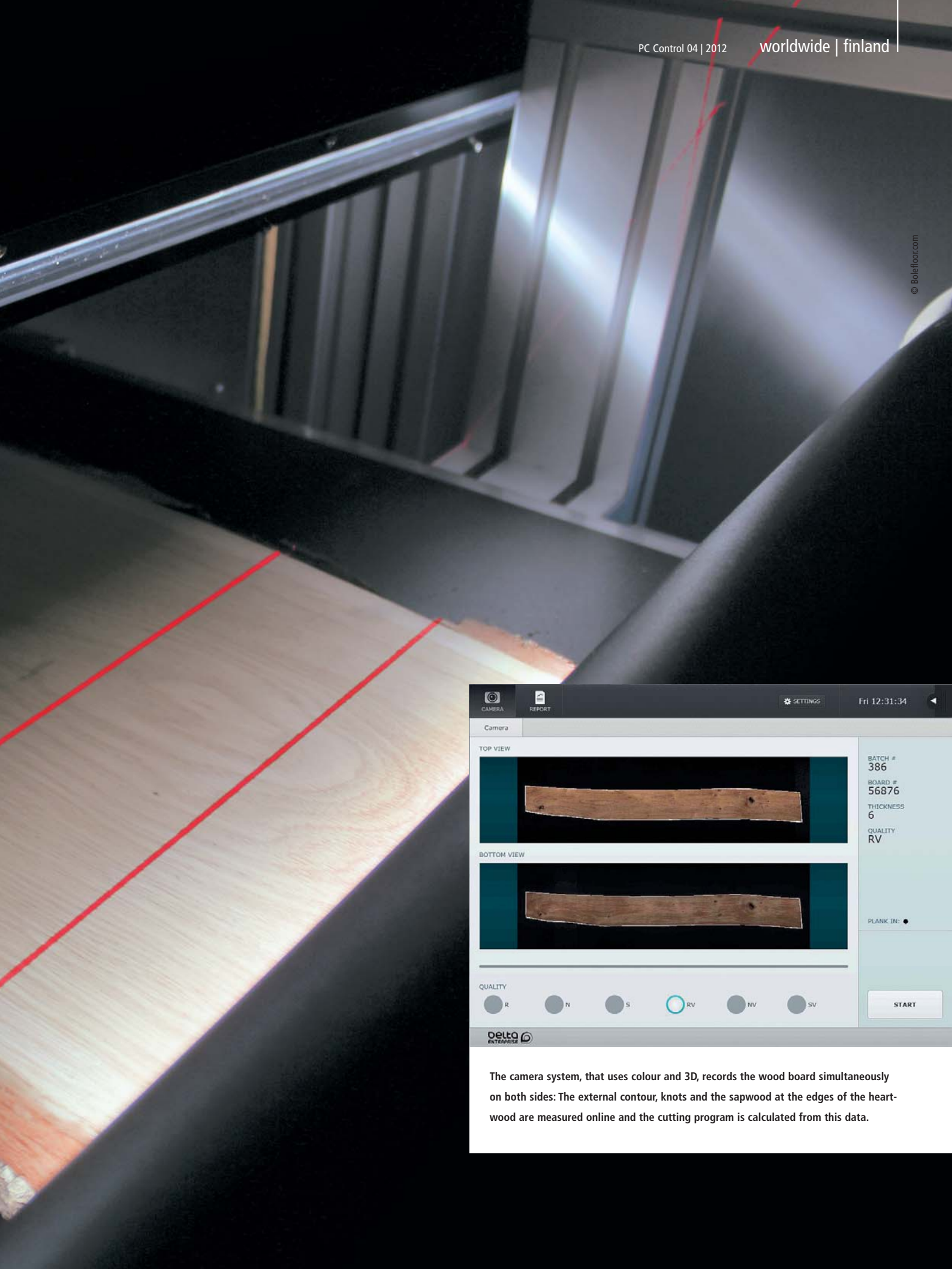


Wood scanner optimizes cutting process in machine-production of wood flooring

# Powerful Industrial PCs for high-speed image processing


Development of image-processing systems for industrial applications is a core business area of the Finnish Oy Delta-Enterprise Ltd. One of the latest customer-specific developments of the company is a wood scanner for wood flooring. It records the shape of the natural edges of the wood and also recognizes defects such as knots and sapwood that affect the cutting. The scanned-in data are transmitted to the Beckhoff Industrial PC via TwinCAT ADS and Gbit Ethernet. TwinCAT controls the transport system and the light barriers.

A board is moved through on a conveyor belt and recorded from above and below as it travels past the two cameras. An encoder operates the cameras at intervals of about 0.5 mm.




Camera

TOP VIEW



BOTTOM VIEW



BATCH # 386  
BOARD # 56876  
THICKNESS 6  
QUALITY RV

PLANK IN: ●

QUALITY

R  N  S  RV  NV  SV

START

delta ENTERPRISE

The camera system, that uses colour and 3D, records the wood board simultaneously on both sides: The external contour, knots and the sapwood at the edges of the heart-wood are measured online and the cutting program is calculated from this data.



The Dutch company Bolefloor is breaking new ground in industrial production of hard wood flooring: instead of straight edges to the wood, the floorboards are curved and follow the natural growth and grain of the tree. In addition to the aesthetic effect, this process gives minimal wastage and an optimal use of the natural resource of wood.

The image processing system was ordered by Bolefloor, a Dutch company based in Amsterdam that is breaking new ground in the industrial production of solid wood flooring. Instead of the usual straight edges to the wood, the floorboards follow the natural growth and grain of the tree, and are curved. In addition to the aesthetic effect, this process gives minimal wastage and an optimal use of the natural resource of wood.

A highly developed technology is needed for the industrial production of wooden flooring like this. The raw, still unedged wood boards are first planed and accurately measured. Then the wood scanner developed by Delta Enterprise comes into play. The camera system, that uses color and 3D, records the wood simultaneously on both sides: the external contour, knots and the sapwood at the edges of the heartwood are measured online. The data are stored in a database. Then the scanned wood items are put into temporary storage. Then, using the image and the contour data, a semi-automatic CAD program seeks out the boards that suit a particular floor area and works out the close matching of the contours of the boards so that when they are laid later they will fit together accurately. Finally a CNC machine is used to cut the floor boards accurately, followed by sanding and packing.

Following preliminary studies in which Delta Enterprise developed the image processing techniques and the corresponding algorithms for this order, the mechanical and electrical equipment had to be designed and selected.

#### **Control is by PC-based Control from Beckhoff**

A board is moved through on a conveyor belt and recorded from both sides as it travels past the cameras. Both inverter-driven belts are fitted with an encoder and the speeds are synchronized. The same encoder operates the cameras at intervals of about 0.5 mm. Accurate measurement is ensured by a special measurement process and the encoder signal.

Delta Enterprise took the decision to base the processing and control system on Beckhoff components. In weighing up the pros and cons of the offerings from different suppliers, considerations such as flexibility, reliability, performance and long-term availability spoke for the PC-based Beckhoff platform. The system uses two powerful Industrial PCs C6920, each with a Gbit Ethernet connection to one of the high-speed 3D color cameras. The two image-processing systems that record the wood from above and below, operate virtually independently of each other. By using two PCs, the flow of data from the process can be processed at very high speed. The cameras simultaneously record color images and height profiles to capture all the features of the wood – both those wanted for the next processing stages and the unwanted ones. An image-processing algorithm uses this data to calculate the optimum way of cutting the wood. The HMI is provided by a touch-screen control panel of type CP6902; the Embedded PC CX9000, with rows of Bus Terminals and TwinCAT PLC, controls the transport and image processing system and reads in the sensor data.

#### **Further Information:**

Oy Delta-Enterprise Ltd. [www.d-e.fi/en](http://www.d-e.fi/en)

Bolefloor [www.bolefloor.com](http://www.bolefloor.com)

[www.beckhoff.fi](http://www.beckhoff.fi)