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Westmill Machine Automation and LightWave Computing Develop NI based *LightSORT™* green veneer moisture sort system

The Challenge: To accurately sort green veneer plywood panels for moisture content on a high-speed veneer conveyor line.

The Solution: LabVIEW Real-Time PXI controller and Cameralink linescan camera provide a high-performance image acquisition and analysis combination.

Overview

Plywood veneer moisture content is very high in the outer “sapwood” layer compared to the inner “heartwood” core. In order to maintain a good glue bond between plywood veneers and maximize veneer strength, each sheet must be dried to within a tightly controlled moisture range. A wet section of veneer in an otherwise dry heartwood sheet can cause steam blowouts and delaminating of the plywood product, resulting in lost production and increased costs.

Various techniques have been attempted to measure the moisture content and sort the green veneer panels accordingly, but previous methods lacked the ability to measure both peak and average moisture contents with the necessary precision (current RF based sensors measure only average and are not overly accurate).

National Instruments Solution

Various alternatives were considered, but most vendors could only provide canned image acquisition solutions that did not have the flexibility or performance to do the job. Still other vendors could provide the performance and flexibility, but required intimate knowledge of complex real-time operating systems and text based programming languages that would have made the development costs prohibitive.

Westmill Machine Automation partnered with NI alliance member LightWave Computing to help develop the software for this patented vision-based moisture sensing system. A high power, tightly pulsed LED linear light source penetrates the veneer on the conveyor and the intensity of the light that passes through each sheet is picked up through a highly sensitive CCD camera and passed to an NI frame grabber on a PXI real-time controller. The image intensity captured correlates closely to the localized veneer moisture content. Each panel is analyzed for peak and average moisture content and then an NI digital input/output module is used to signal downstream PLC's as to which bin to put the panels in.

The real-time chassis communicates over an Ethernet interface to a Windows-based user interface application. This allows plant operators to select sort criteria based on peak moisture, average moisture,

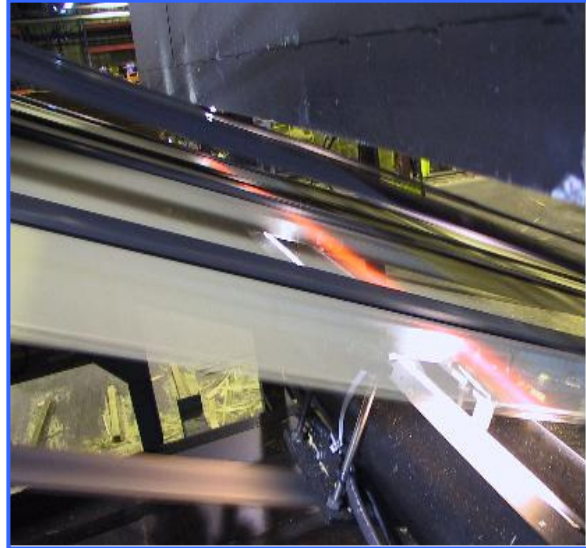


and wood species on-the-fly while the RT system sends sort statistics to help users help verify proper system operation. The real-time system also displays the panel images with coded captions via the PXI controller's video out port.

The LabVIEW development environment and IMAQ vision software has a huge array of analysis tools to easily perform the required image analysis. The Cameralink interface's flexible triggering capabilities enabled easy integration of the camera into the system.

The LabVIEW 8 Advantage

This project required the development of two programs, a real-time application running on a PXI chassis and a Windows based application running on an industrial PC. LabVIEW 8 improves on the productivity of the LabVIEW environment with the advent of shared variables, enabling easy sharing of data between the real-time and Windows system. In addition, LabVIEW 8 provides the ability to debug both the real-time software and the user interface software at the same time, while both systems are running. This avoids the requirement of having to switch between target systems when making changes to either system, further improving the productivity of the LabVIEW development environment.



Conclusion

The tight integration of the LabVIEW development environment and IMAQ vision tools provided both the performance and ease-of-use lacking in other vendors solutions. Together these parts enabled us to build a reliable system that performs all the required analysis in the tight time window available to signal downstream equipment. As a result, plywood mills using Westmill's patented LightSORT™ Green Veneer Moisture Measuring system can expect to see a huge improvement to their bottom line.

For more information on this project or if you would like an assessment of your Testing or Machine Automation requirements, please contact Rob Taylor at LightWave Computing.



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