

Control Logic rip optimizing machines offer advanced, accurate, 2D shape scanning with powerful, industry-proven 2D optimization.

Control Logic rip optimizing machines ensure defect-free wood products

## High-tech lumber scanners utilize Embedded PCs

→ Of all the various raw materials available to builders and furniture manufacturers, wood is naturally the leading material today as it has always been. Of course, manufacturing with lumber is not without challenges – following the process from tree to lumberyard to finished structure, wood carries a wide range of potential imperfections with it along the way. Headquartered in Hickory, North Carolina, Control Logic offers process control, 2D scanning, data collection, and optimizing systems almost exclusively for solid wood, with over 80 percent of the company's business in these areas.

Advanced wood processing is increasingly based on fully automatic high-performance lines, starting with cutting of raw wood. An upstream scanner forms an integrated component of the overall system. The scanner picks up the relevant lumber data (knots, warps and discoloration, etc.) and transfers them to the downstream machines such as rip saws and optimizing miter saws at full production speed. Exact measurements help promote optimum wood yield and quality. Without such automatic detection systems the high system performance would be inconceivable. The tasks handled by the system are very demanding in terms of control technology. Control Logic is a leading provider of rip optimizing technologies and develops high-performance process control systems for lumber ripping, cutting, grading and tracking. Since 2002, Control Logic has been an operating company of the Weing Group based in Tauberbischofsheim, Germany. Control Logic's customers range from small cabinet shops of less than 10 people, all the way to enormous multi-national suppliers of consumer furniture products. Most of Control Logic customers are manufacturers that produce consumer goods such as furniture and cabinets or building products like flooring, moldings and board materials.

### Efficient, flexible and accurate scanning

Control Logic rip optimizing machines offer advanced, accurate, 2D shape scanning with powerful, industry-proven 2D optimization. The ripping platform is completely scalable and supports fixed or moveable rip saws. The precision servo-driven fence system is as reliable as it is accurate. The scanners measure the shape of the boards to be ripped and detect surface defects. The systems mathematically determine the optimum ripping path for each board based on these conditions. "This process is 'computationally intensive,' requiring far more from processors than just control functions – a major reason why the PLC approach became limiting," said Chris Aiken, President of Control Logic.



### Machine re-design ensures competitiveness for changing markets

Like most machine builders in North America, Control Logic is facing the double-edged sword of having to provide ever-increasing productivity and value at a lower cost. "To stay competitive, we must focus on delivering our solutions with an affordable price tag, while improving both functionality and sustainability," Aiken said.

This has been very pronounced in the furniture industry so most of Control Logic's remaining North American customers are small to mid-size companies that require more innovative and flexible solutions and require a lower cost of ownership. "Many of our customers do not have a full-time maintenance staff, but rely instead on the machine builders to help with diagnostics, trouble-shooting and provide efficient remote service," Aiken said.

In order to help their customers stay competitive in a difficult market, Control Logic sought to optimize its ValuRip™ product offering line via a complete system re-design. The primary goals of the re-design were to:

- | maintain a lower system price point,
- | offer a cost-effective yet high-speed shape scan function as standard,
- | create modular software and controls that enable the end user to select machine modules that match unique production needs,
- | reduce the number of hardware components,
- | and design a system that was still easy to troubleshoot and service remotely.

### CX Embedded PC deals with control system and data management

"When we evaluated our current offerings, we found that all Control Logic systems included both a PC and traditional PLC control hardware. This was not efficient in terms of software or in space usage, resulting in larger electrical cabinets, more complex software as well as more problematic support and remote service conditions," Aiken said.



Integrated Laser Alignment Rack, controlled by a CX1020 Embedded PC

Control Logic rip optimizing systems measure the shape of the boards to be ripped and detect surface defects.



The ValuRip Plus™ incorporates a Beckhoff CP6901 Control Panel with DVI/USB interface as the HMI hardware.

The new ValuRip Plus™ system's operational performance and development efficiency have each increased by 25 percent.



"When we began our new design, we looked across the control landscape, and found the concept of combining both our PLC and PC platforms on a single DIN-rail intriguing," Aiken said. "The Beckhoff Embedded PC platform allowed us to remove many of the extraneous interface layers that we had in the previous system design, while becoming both space- and cost-efficient. It was the only method we found that gave us the comfort of a hard real-time PC environment and rugged, cost-effective industrial hardware," Aiken said.

**EtherCAT enables communication at microsecond level**

Finding the optimum processing power for the ValuRip Plus™, Control Logic selected the CX1020 Embedded PC with TwinCAT NC PTP for complete automation, axis positioning and controls device management. The CX1020 is connected to a Beckhoff CP6901 Control Panel with DVI/USB interface as the HMI hardware. AX2003 Servo Drives with EtherCAT interface are used for the drive system. "The CX1020 brought Control Logic software efficiency, scalability and fewer required communication layers," Aiken explained. "In addition, the Embedded PC format provides 'mechanical efficiency' via a single DIN rail mounted device. Furthermore, networking with EtherCAT I/O Terminals provided industry-leading performance via real-time, high-speed updates at a lower cost than I/O technologies that aren't Ethernet-based."

**Scan function optimized in terms of speed and cost**

"In addition to the obvious controller efficiencies with regard to size and cost, the biggest functionality improvement in the new control system was with I/O update rates," Aiken said. "This was very important to us because we wanted to create a very low-cost 2D shape scanner." This requires a photo-electric array (one per foot) over which the lumber is transported with a high-precision surface – in the case of the ValuRip Plus™, a high-friction belt. To perform the measurement, Control Logic had to sample the presence of the material at a very high rate. "In the past, we couldn't poll the inputs with a PLC at this rate and were forced to perform the task using a PC I/O card and a custom device driver which we developed and maintained," Aiken explained. "So, the great improvement for Control Logic is that with the high-speed performance of both the EtherCAT I/O and the CX1020 processing power, we are able to accomplish the scanning task without custom I/O frameworks, or delicate in-house software."