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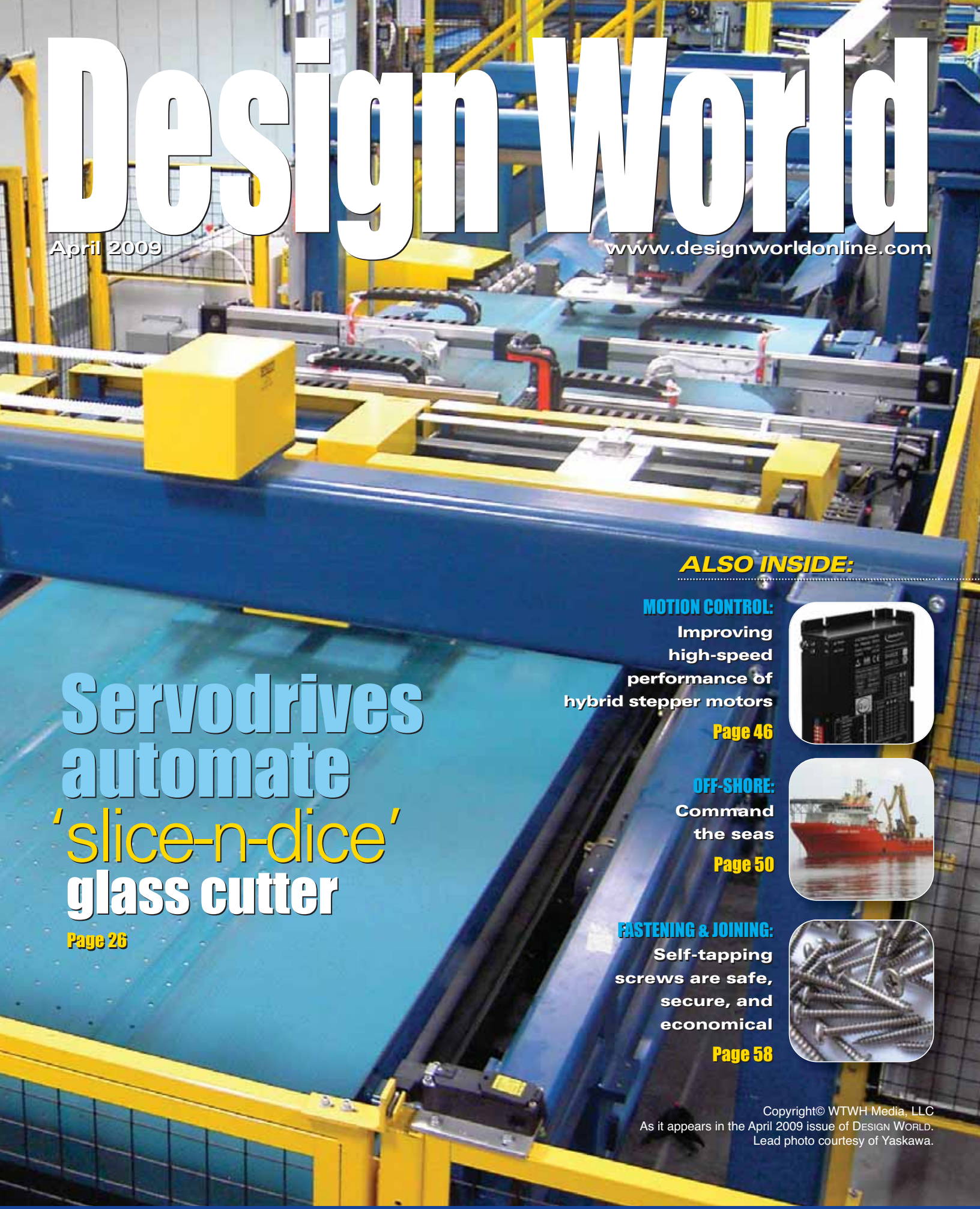

Servodrives automate 'slice-n-dice' glass cutter

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Servodrives automate 'slice-n-dice' glass cutter

Through the addition of automatic systems, engineers at Glassline Corp., Perrysburg, Ohio, helped their customers achieve an average 33% more throughput with their processes. Glassline specializes in glass-processing machinery and diamond tooling for the automotive, architectural, furniture, and appliance industries. Customers wanted more flexible, faster and easier to change equipment, so the engineers added automatic systems that reduce the number of manually changed parts and physical adjustments.

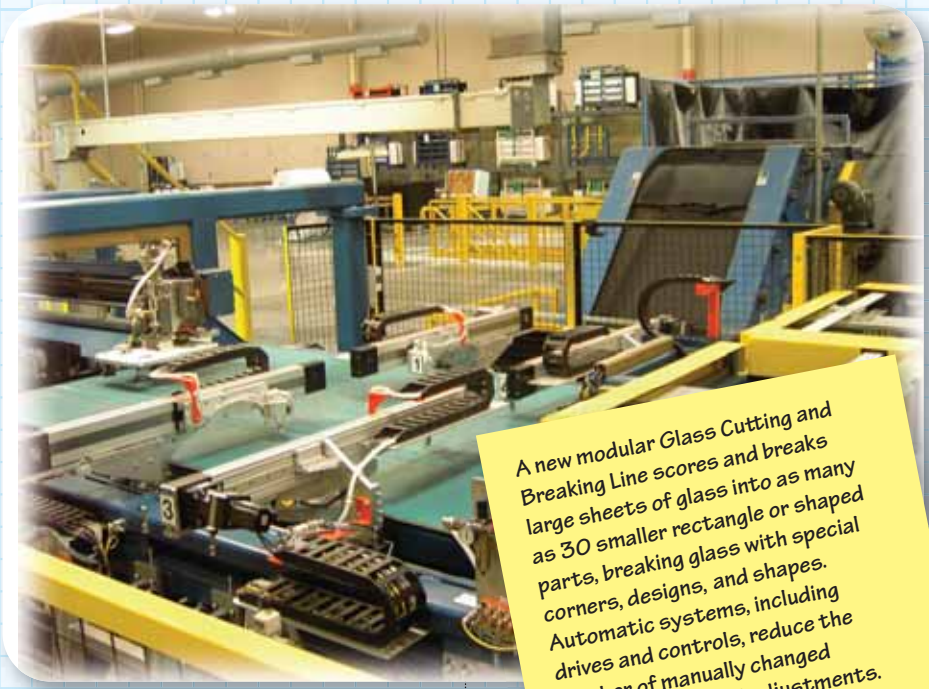
Based on a modular design, the new Glass Cutting and Breaking Line scores and breaks large sheets of glass into as many as 30 smaller rectangle or shaped parts. It consists of more than a dozen stand-alone machines essentially configured into three separate sections for loading, CNC cutting, and breaking. The automated capability to break the glass with special corners, designs, and shapes is what makes this machine unique.

The breaking system is the largest section and encompasses the straight-cut breaks, part-reorientation shuttle, dynamic-part squaring, shape breakout, and unload shuttle. These sections can be added or subtracted to meet customer requirements. This modularity makes the machine easier to design, build, ship, and install.

"We saw the opportunity to build an innovative cut-down line," stated Brad Borkosky, general manager, Glassline. "This machine was an intense design effort from both a mechanical and electrical standpoint."

Although Glassline already had the cutting and breaking technologies available, there were design and programming challenges. Typically, each smaller part within the large block was oriented differently, therefore it had to be tracked, and the breaking system parameters needed adjustment in real time for each individual piece. Other aspects of the specifications also presented challenges, such as raw glass size variation, trim size variation, customer shape data format and part output orientation.

Glassline tailored its WinShape shaping and nesting software to include



A new modular Glass Cutting and Breaking Line scores and breaks large sheets of glass into as many as 30 smaller rectangle or shaped parts, breaking glass with special corners, designs, and shapes. Automatic systems, including drives and controls, reduce the number of manually changed parts and physical adjustments.

the ability to optimize the cut order of all the shape, relief, and straight cuts, to set the breakout points, and to include programming templates for the customer.

Networks connect the modules together. MECHATROLINK-II coordinates servos for fast, precise, and deterministic motion. It allows portions of the machine to shut down for safety purposes while other parts continue to run. Machine control and status information passes between the controllers and HMI through an Ethernet connection using OPC, Ethernet/IP, and Modbus/TCP protocols.

At the heart of the control system is the IEC-based MP2300Siec controller from Yaskawa Electric. It meets the IEC61131-3 programming standard. The use of this controller and MotionWorks IEC software increased code flexibility, modularity, and readability. "We went with that controller to reduce cabling and to have tighter integration between all components in the line," said Jeff Gottschalk, control engineer, Glassline.

The engineers have leveraged the control program to develop more than 30 reusable functions and associated data structures, reducing engineering costs and improving delivery times. "The ability to import codes developed on previous jobs has cut programming time by as much as 30 to 40%," Gottschalk noted.

The machine uses a combination of Yaskawa servo and variable frequency drives, including V7 inverters, 25 axes of Sigma-5 servos, and a pair of the controllers. Of the servo axes, seven are direct linear servos, 17 are standard rotary and one is a high-torque, low-speed, direct-drive rotary servo.

"We took advantage of Sigma-5 tuning," mentioned Gottschalk. "We used the advanced autotuning function on most axes while using the one-parameter, fine-tuning on the cutter and linear motors."

The new cutting machine is not only larger, it is also faster and more accurate due to the linear motors and Glassline's patented direct-drive, servo-cutting head.

Through the linear servo system, the machine accelerates four times faster than previous machines of its type, reaching cutting speeds of 180 m per minute.

Accuracy has improved from 0.1 mm to 0.05 mm on glass thicknesses ranging from 2 to 6 mm. Glass positioning alignment tolerance is 0.1 to 0.5 mm. There are 100 programmable break locations including 25 on each of the four breaker arms. Acceleration reaches 0.75 to 1.0 G.

About 99% of all set-ups and adjustments are automatic. The raw-glass squaring system accounts for glass size and then feeds the information onto the cutter to adjust the cut program. The breaking system uses the data to automatically adjust the straight-line breaks, part orientations, and breaking fingers.

"The automation was a big improvement and is the main selling point since it greatly reduces changeover time, decreases the labor required to do the work, and cuts down on the amount of wasted glass by getting more parts out of every sheet," Gottschalk said.

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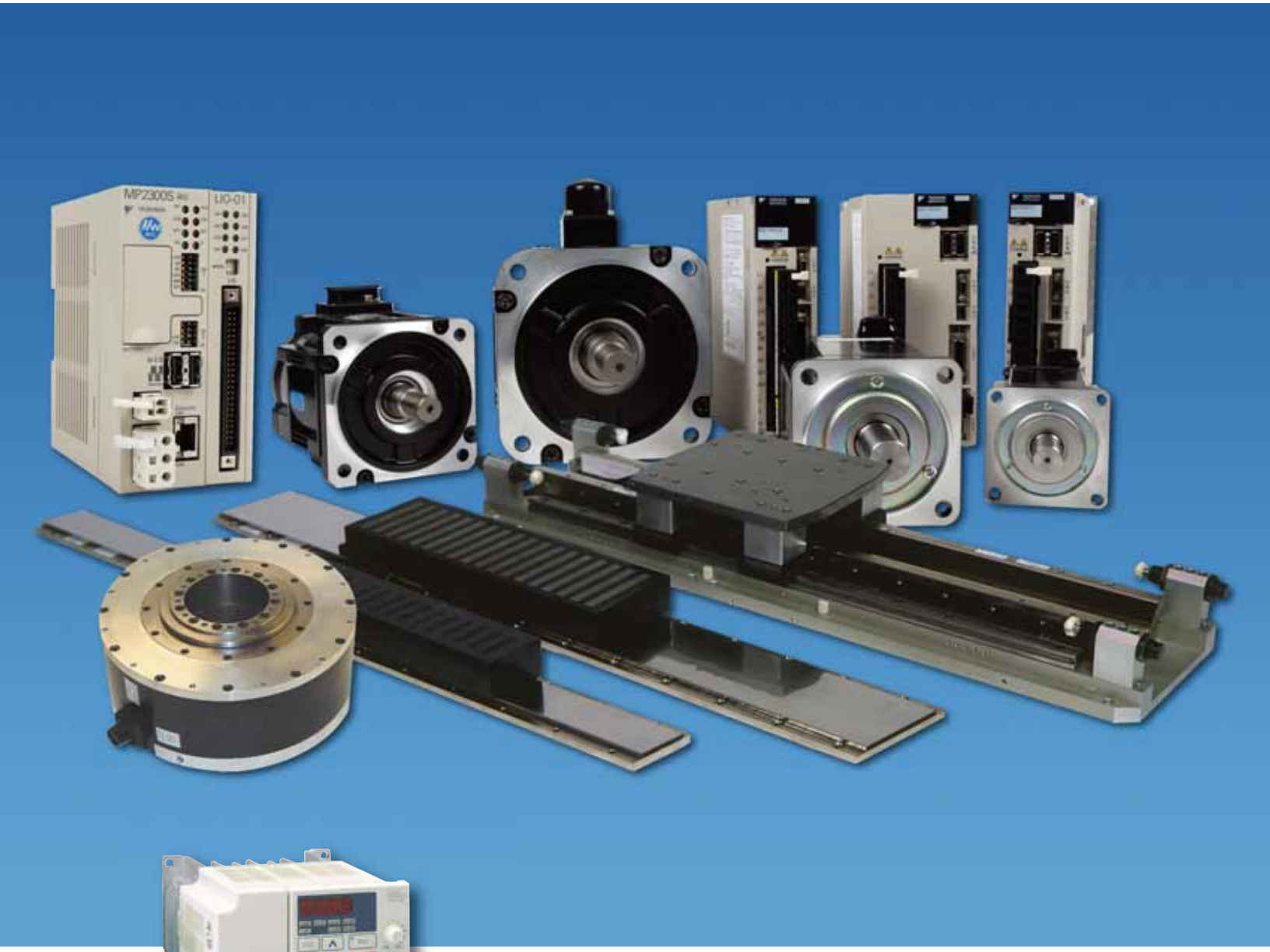

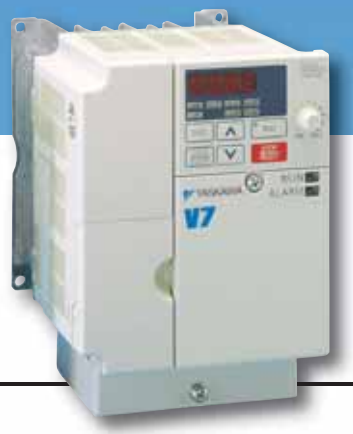

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