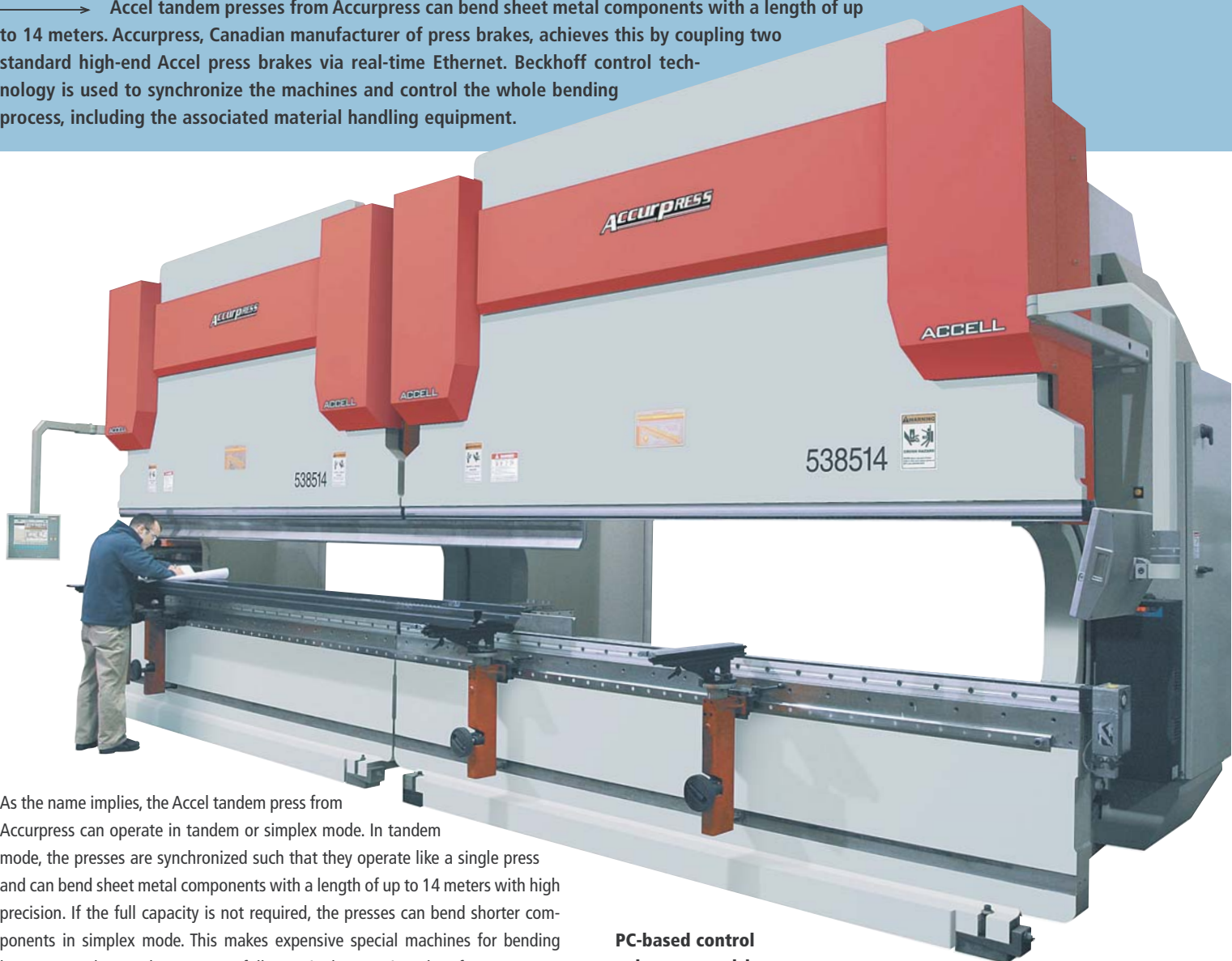


Tandem press for XXL sheet metal parts uses PC Control

Real-time Ethernet couples the work of two presses

→ Accel tandem presses from Accurpress can bend sheet metal components with a length of up to 14 meters. Accurpress, Canadian manufacturer of press brakes, achieves this by coupling two standard high-end Accel press brakes via real-time Ethernet. Beckhoff control technology is used to synchronize the machines and control the whole bending process, including the associated material handling equipment.

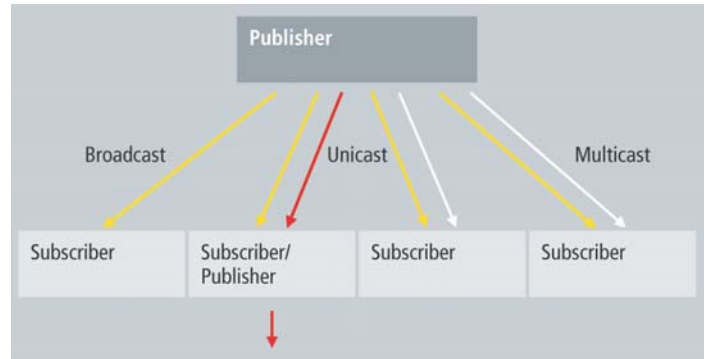


As the name implies, the Accel tandem press from Accurpress can operate in tandem or simplex mode. In tandem mode, the presses are synchronized such that they operate like a single press and can bend sheet metal components with a length of up to 14 meters with high precision. If the full capacity is not required, the presses can bend shorter components in simplex mode. This makes expensive special machines for bending longer parts that rarely operate at full capacity but require a lot of space unnecessary. Depending on the size of the sheet metal components and the batch size, the coupled press brakes operate in simplex or tandem mode with a speed of 20 mm/s and a parallelism accuracy of ± 0.01 mm. "We created the first tandem press following a request by a customer," said Alex Kvyatkovski, R&D Team Leader at Accurpress. "It was clear to us that the coupling should be implemented via the control system. Together with Beckhoff, our control equipment supplier for all Accell presses, we achieved the coupling via real-time Ethernet."

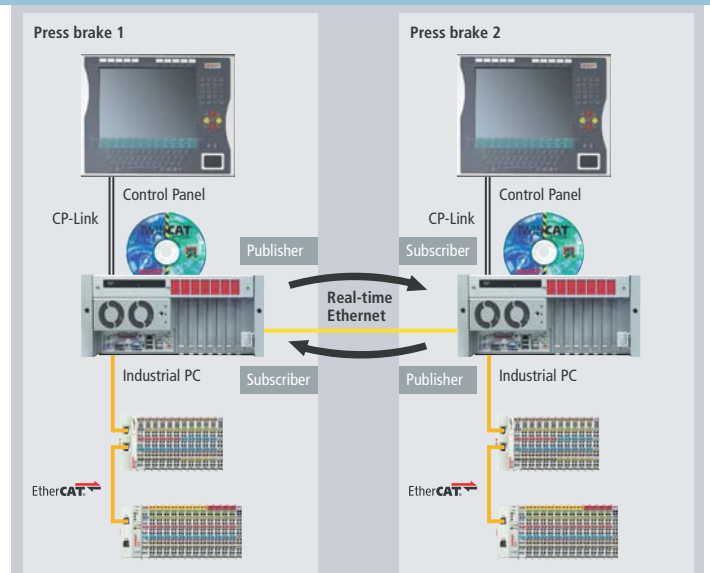
PC-based control enhances precision

At the core of each Accell press is a C6240 control cabinet Industrial PC from Beckhoff with Windows as the operating system and the TwinCAT automation platform. In addition to PLC functionalities and Motion Control, the C6240 also deals with HMI integration. Rugged Beckhoff CP7037 Control Panels with TFT displays are used as HMI. EtherCAT, the ultra fast Ethernet-based fieldbus for industrial applications, links the I/O level with the control system. EtherCAT offers low cycle times and therefore high precision and repeat accuracy in a cost-effective

Based on the publisher/subscriber model, the publisher makes variables available to one subscriber (unicast), several subscribers (multicast) or all subscribers (broadcast).



The press brakes exchange information on set and actual position, velocity, recipe step, job and machine status and special key positions based on the publisher/subscriber model.



manner. Beckhoff EtherCAT Terminals integrate the sensor and actuator level with the control system. Serial interfaces are available via the IPC.

Openness simplifies coupling

The clear hardware architecture, in conjunction with the open TwinCAT automation platform, creates practically unlimited flexibility. Accurpress can adapt any press to customer requirements without great effort. Functions can be modified and complemented simply through programming, without the need for special hardware.

Similarly, two presses can be easily coupled to form a tandem press via real-time Ethernet communication. On the hardware side, the C6240 IPCs are complemented with a standard Ethernet fieldbus card and networked with standard Ethernet cables, further reducing cost. The devices are addressed directly via the hardware addresses of the network cards.

The press brakes operate based on the master/slave principle. Depending on the application, one press acts as the master while the other press acts as the slave. For switching from simplex to tandem operation, the machine operator selects tandem mode on both machines, specifies the master and slave, and uploads the recipe to be processed to both control computers. From then on, the machine operator only uses the operating panel of the master and the slave follows the mode of the master (manual, semi-automatic or automatic).

Real-time communication optimizes processes

The controllers of the coupled presses communicate using the publisher/subscriber model (TwinCAT network variables). Each controller acts as publisher and subscriber, creating a permanent bidirectional data link. In general, the publisher sends information without concern for proper configuration. Communication monitoring takes place in the subscriber. The publisher makes its current machine

data (actual and set positions, velocities, recipe steps, job and machine status) available to the subscriber of the other machine with a cycle time of 2 ms. In simplex mode, the receiver deletes the data. In tandem mode, the subscriber receives the data intended for it, while the machine control system processes them and controls the press according to the current process data. While running in tandem mode, the presses are synchronized through continuous bidirectional data exchange and adaptation of the machine control parameters. In parallel, the machines also monitor their respective states and main bending parameters such as mute, pinch and retrack point. "Real-time Ethernet coupling based on the publisher/subscriber model offers a cost-effective and convenient way of implementing precise tandem presses with high repeat accuracy and process reliability," said Alex Kvyatkovski. "In addition to bending straight edges, we can now bend oblique edges by using different recipes with different start or target positions."

—> Accurpress www.accurpress.com

—> Beckhoff Canada www.beckhoffautomation.com