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## Bending and pressing (Wireless) safety foot switches for metal forming

Remote control switches can be used in many ways in machines for metal forming, as demonstrated by three different examples. Wireless technology increases ergonomic comfort when operating press brakes and swing-folding machines, and it also plays a role in some new and unusual automation concepts.



Picture: Carl Geisser AG

*Foot switches (cabled or wireless) are the key actuating elements in Xpert 40 press brakes.*

Both industrial companies and craftsmen use swing-folding machines, for example when producing facade elements. These

machines are usually operated by a safety foot switch. Thalmann Maschinenbau AG, a Swiss manufacturer of high-quality swing-

folding machines, offers a wireless actuator as an option for its ZR series of fully hydraulic plants. This is a safety foot switch from the steute Wireless range which communicates with the receiver in the control cabinet via a safety-related wireless protocol.

## Wireless protocol for safety applications

The foot switch uses the sWave 2.4GHz-safe safe wireless protocol, based on the physical layer of the IEEE 802.15.1 standard. Due to its high reliability, guaranteed for example by FHSS (frequency hopping spread spectrum) on 79 channels and AFH (adaptive frequency hopping), it is especially suitable for use in rough industrial environments. Additional advantages are its good coexistence with other wireless systems and its two-channel design. Foot switch and receiver unit can be clearly assigned, meaning that several safe foot switches can work in parallel within one transmission zone. The wireless signals are evaluated by a combined wireless receiver and safety relay module installed inside the control cabinet. The assigned antenna is mounted on the control cabinet. The system, comprising wireless foot switch and receiver unit, is EC-type examined and classed at performance level (PL) d according to ISO EN 13849-1 and SIL 2 according to IEC 62061. From the point of view of the operator, the wireless system has the benefit of being freely positionable anywhere along the machine without restriction. This improves ergonomic comfort because it enables a clear view of the process at all times and prevents tripping hazards due to cables lying on the floor.

## Foot switches as key actuating elements

The press brakes in the Xpert series from Bystronic also mainly feature foot switches (in this case with two pedals) as their human-machine interface. The operator holds a sheet of metal against the backstop of the press brake and presses the right hand pedal of the foot switch. The upper cheek then comes down, causing the desired degree of bending. To the observer this looks like a rapid sequence of grasping (the next workpiece), actuating the foot switch and lowering the upper cheek of the press brake. In parallel, the backstops position themselves automatically to ensure that the workpiece is always correctly inserted. If the operator would like to make a correction, for example because the angle is not correct, he can open the tool using the other pedal of the foot switch. In the Xpert series, the foot switch is the key actuating element, connected to the press brake by a cable and thus freely positionable within the limitations of the cable length. The GSF 2 VD series was developed especially with applications in press brakes and other metal forming machines in mind. It can be operated without fatigue and its three-stage switching insert means that a press stroke can be triggered without any of the backlash which is usually unavoidable with conventional switching inserts. Operation becomes even more flexible when users opt for a wireless foot switch. All the functions remain the same, but the signal is transmitted by remote control instead of through the cable. This further increases ergonomic comfort with regard to positioning, and also increases availability because there are no cables which can become damaged and fail.



*ByAutonom 4020 with  
ByTrans 4020 Extended*

*Pictures: Bystronic Deutschland GmbH*

Because operators are not keen on unexpected battery changes, an extension board has been developed as an additional module, enabling the battery charge status to be communicated to the control system.

### **Robot automates bending process**

But this is not the only application for wireless switches in Xpert machines. Bystronic has recently developed a solution enabling a normal press brake to work fully automatically if required. A mobile robot cell with a 6-axis robot is positioned in front of the press brake and references it autonomously. The robot takes a sheet of metal from the integrated stack, places it in precisely the correct position, initiates the bending process, grasps and moves the sheet several times and then throws it out as finished. This mobile bending cell opens up a wealth of new possibilities for press brake operators.



*A mobile bending cell facilitates automation of a conventional press brake.*

They are now able to manufacture small series flexibly and manually during the day shift, and then in the evening the robot cell can be connected – a matter of ten minutes – and serial parts produced in a night shift requiring no manpower. One of the requirements for automated operation is detection of the backstop against which the sheets of metal are pressed. This task is assumed by a microswitch with an extremely short switching distance which detects precisely when the sheet metal is positioned correctly against the rear clamping point. The signals exchanged between the press brake and the robot cell are also taken care of by wireless technology. Bystronic integrates this technology inside an in-house unit which contains not only the microswitch, but also the battery compartment. This unit can be connected to different Xpert 40 press brakes and thus also retrofit existing press brakes for automation. The clamp on the machine must be exchanged and the

wireless contact finger retrofitted, that is all.

The wireless module can then communicate with the robot cell.

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