Embedded Safety and Guarding Solution

FOR PRESS BRAKES

MARCH 2021

Overview

Our OEM embedded safety and guarding package offers press brake manufacturers a flexible and efficient solution with uncompromised levels of safety, functionality and performance. We offer a tailored solution packaged together with the ESA CNC and includes the PCSS-ESA safety controller paired with the LZS-ESA optical guarding system and optional mounting brackets. The customised integration between the PCSS-ESA safety controller and ESA CNC has been developed in collaboration with ESAutomotion and Lazer Safe to streamline the press brake design process and automate the machine safety and guarding functions. Through our dedicated user interface, the operation and functionality of the machine and embedded safety functions deliver a simpler, intuitive and more efficient user experience.

Safety controller

PCSS-ESA

Optical system

LZS-ESA

Compatibility

The PCSS-ESA and LZS-ESA package is compatible with our complete range of VIS-600 and VIS-800 controllers.

PCSS-ESA embedded safety controller

PROGRAMMABLE CONTROL & SAFETY SYSTEM

PCSS-ESA is a programmable safety controller that is specially designed to improve the performance and safety of press brakes. It provides flexibility for the press brake manufacturer and simplifies the design process by combining all related control, safety and monitoring functions into a single system and eliminates the need for complex integration of third party components and software. PCSS-ESA provides an optimal balance of functionality and performance with reduced build cost.

Compact and powerful

PCSS-ESA replaces conventional safety PLCs, safety relays and modules, guarding system controllers and muting hardware. The small foot print takes up minimal cabinet space with all safety, control and guarding elements connected directly to a single source. This cost effective design reduces the number of components and eliminates complex wiring for a clean and efficient cabinet layout.

Software simplified

CE Certified kernel software with pre-programmed safety function modules takes the work out of designing, testing and certifying system software. A user programmable application integrates with the kernel enabling the manufacturer to simply select the modules that suit the specific machine design and provides flexibility to program additional non-safety functions. This is ideal for finalising machine certification quickly and efficiently.

Optical protection option

The PCSS-ESA controller is paired with the LZS-ESA optical guarding system, so no additional control hardware or software is required. This provides a more efficient guarding solution and enables a high-level of machine performance with a speed change point of 4mm when forming flat material as well as complex part profiles with side flanges.

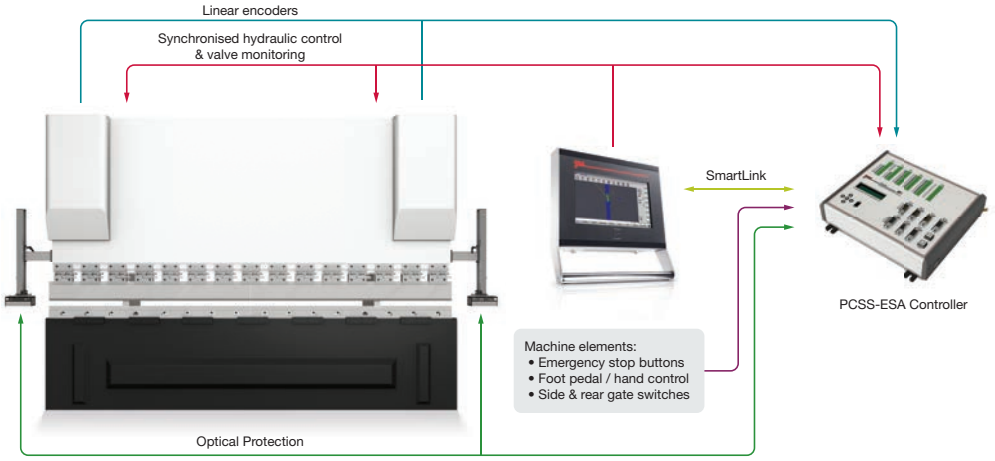
PCSS-ESA Standard features

- Fully embedded communication software interface with the ESA CNC system.
- Streamlined management of machine safety elements including valve control, valve monitoring, foot pedals, hand controls, emergency stop, side and rear gate switches, level switches, etc.
- Optical protection system management, control, muting and monitoring.
- Dual optical protection support. LZS-ESA optical protection and third party light curtains can be installed on the same machine.
- Connects to Y1/Y2 linear encoders for automatic speed and stopping performance monitoring.
- CE Certified hardware and software.

PCSS-ESA design

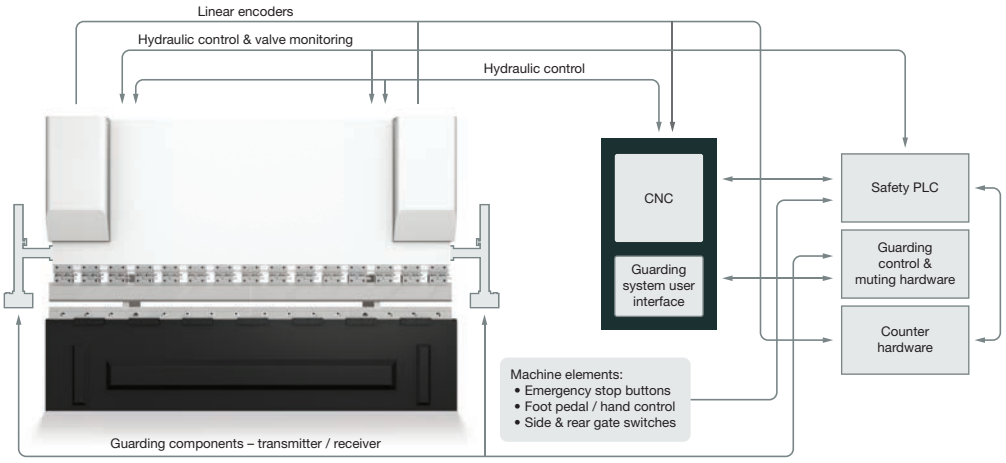
COMPARISON

Press Brake design streamlined with the PCSS-ESA Platform



This provides an efficient and cost effective platform with fewer components, reduced wiring, simplified interface and CE Certified hardware and software to minimise engineering and build time.

Press Brake designed with third party components



Traditional press brake design increases the level of complexity and requires many third party components to be made to work together leading to hardware and software compatibility issues, adds extra wiring and increased cabinet size. The manufacturer must consider CE Certification in design and integration when using third party hardware components plus develop and certify the control software. This inefficient design leads to longer manufacturing time and increased build cost.

PCSS-ESA

SPECIFICATIONS

1. Input and output connections.
2. LCD display.
3. Display navigations buttons.
4. TX & RX connections for LZS-ESA and light curtains.
5. Linear encoder input and output connections (Y2).
6. Linear encoder input and output connections (Y1).
7. ESA CNC SmartLink communications.
8. Software transfer and diagnostics.

	PCSS-ESA
Technology	
SmartLink	●
FlexSpeed	●
AutoSense / AutoSense Plus	●
AutoSense Ultimate with Dynamic Valve Monitoring	●
Specifications	
Safety Inputs	12
Safety Outputs	4
Standard Inputs	24
Standard Outputs	6
Linear Encoder I/O	2, both Y1 and Y2
Minimum encoder resolution	0.1 micron
Speed capacity of the encoder counters	> 300mm/second
Response time (hardware interrupts)	< 1ms
Dimensions	229mm x 189mm x 45mm
Optics Compatibility	
LZS-ESA	●
Third party light curtain support	●
Dual guarding support	●

PCSS-ESA technology

Industry leading PCSS-ESA technology is designed to maximise press brake productivity and performance, streamline operation and enhance functionality and safety.

FlexSpeed is an advanced high speed hardware architecture that achieves faster response time to enhance machine performance and efficiency.

Traditional safety control systems employ a combination of hardware and software processing. This inefficient process slows down overall response and reaction times and when coupled with optical protection systems leads to a reduction in machine performance by forcing the machine to operate at reduced closing speed in order to improve stopping performance and increasing slow speed travel prior to bending.

FlexSpeed eliminates these delays and imposes no restriction on machine performance. This enables machines to operate with maximum speed and efficiency.

SmartLink is an advanced communications process that seamlessly integrates control, safety, guarding functions with the ESA CNC system to enhance the operation, functionality, performance and efficiency of the press brake.

AutoSense is an automatic monitoring technology that tracks machine operation and performance in real time. AutoSense automatically monitors control commands, motion, direction, speed and stopping performance to maintain a high level of machine and operator protection. AutoSense also guarantees compliance with international safety standards that mandate automatic monitoring of machine overrun and safe speed.

AutoSense Plus provides additional monitoring to detect and diagnose specific machine electrical and hydraulic faults with visual alerts displayed on the ESA CNC via SmartLink. Machine faults are quickly and easily identified to get the machine back into production with minimal downtime.

AutoSense Ultimate adds advanced Dynamic Valve Monitoring technology to automatically monitor hydraulic valves, associated control commands and machine actions. Dynamic Valve Monitoring reduces machine build cost and complexity by eliminating the need for separate monitoring systems and monitoring sensors built into the hydraulic valves. AutoSense Ultimate is available as standard with selected systems.

Optical protection technology

Our patented optical protection technology provides a high level of safety and functionality for the machine operator. Through the combination of dynamic muting and independent management of the optical sensors, machines can operate safely without compromising productivity or performance.

Close proximity protection enables safe handling of the work piece during high speed closing.

The LZS-ESA optical protection system comprises a laser transmitter and receiver that are mounted to the upper beam of the press brake. A continuous laser field protects the zone directly below the punch tip allowing the operator to hold the work piece as the tools close at high speed. If an obstruction is detected the machine is automatically stopped.

This close proximity protection allows the operator unrestricted access to the point of operation for increased productivity and unlike traditional light curtains, reduces fatigue by enabling the operator to remain standing in the same position.

The laser field is processed by the receiver and divided into three continuous zones to detect obstructions entering from the front, sides and rear of the tool area.

The front zone provides protection forward of the tool while the middle zone protects the area just behind the tip of the punch. The rear zone provides additional protection for the open gaps created when segmented tooling is used. The protective zones are independently and automatically muted to suit different shaped work pieces allowing parts to be formed safely at high speed to achieve maximum productivity.

Optical protection system

The LZS-ESA optical protection system is designed to provide a high-level of operator safety combined with simple setup and a low speed transition point to reduce machine cycle time for improved performance.

LZS-ESA

CLASS 1
BLOCK LASER

1. M12 plug for connection to PCSS-ESA
2. Status LEDs - Power / Laser
3. Status LEDs - Power / Front/middle/rear Sensors

	LZS-ESA
Specifications	
Optical protection functions	●
Laser transmitter	CLASS 1 Block laser
Receiver	Multi-sensor photocell receiver
Maximum recommended optical range	8 metres
Minimum object detection resolution	4mm
Connector type	M12 8 pin
Tool compatibility	V tools and non-standard tools
Integrated status LEDs	●
Technology	
RapidBend -	●
Performance	
Minimum speed change point - flat sheet bending	4mm
Minimum speed change point - box bending	4mm

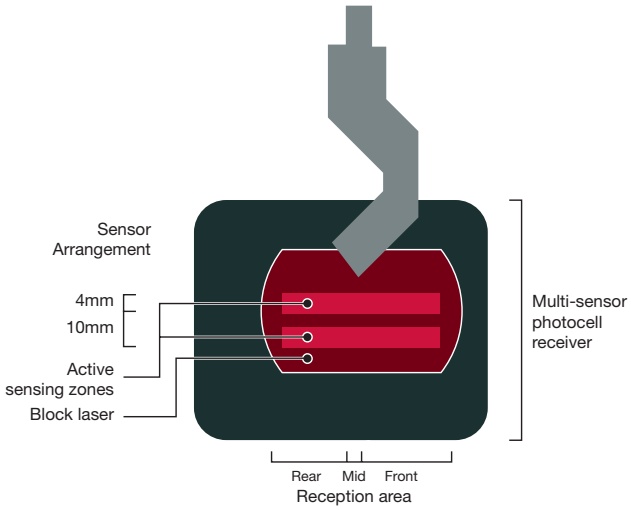
Optical protection technology

RapidBend technology enables press brakes to operate with a high level of performance, without compromising safety.

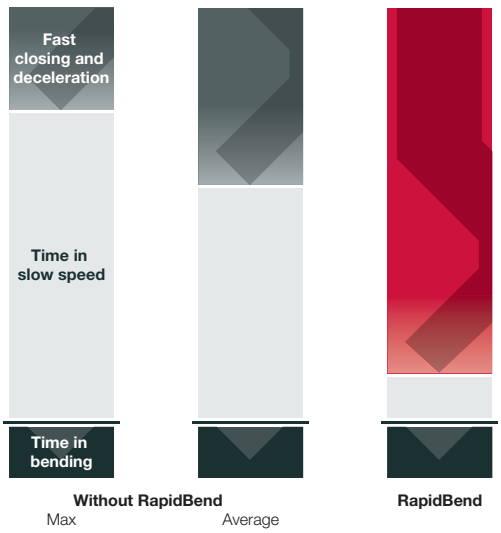
Through a two-stage dynamic muting process, the tools can close safely at maximum speed, then transition to bending speed when the punch is 4mm above the material surface.

RapidBend works with a wide range of part profiles including box bending with side flanges. In comparison with other light or laser based guarding systems, RapidBend technology can reduce machine cycle time by up to 2 seconds per cycle, representing a significant saving in operating time and cost.

In comparison to other light or laser based guarding systems, RapidBend technology can reduce machine cycle time by more than two seconds per cycle. This represents a significant saving in operating time and cost. RapidBend guarantees this high level of performance irrespective of machine fast closing speed or stopping performance.



LZS-ESA



How optical protection works

All functions of the optical protection system including mute-point management, mode selection and user messages are embedded within the ESA CNC system (via SmartLink). A suite of integrated and flexible operating modes are available in the ESA CNC bend program and can be configured to suit the size and profile of each unique part. These modes are automatically managed for each individual bend to achieve optimal part processing speed and efficiency.

Muting

Muting temporarily deactivates the optical protection just before the punch makes contact with the material allowing the bend to be completed. When the bend program is started the tool and material data is transferred from the ESA CNC to the PCSS-ESA controller via SmartLink. The mute-point position is automatically calculated at 2mm above the programmed material surface and this position is optically verified on every cycle.

Operating modes

SmartLink enables guarding modes to be selected in the ESA CNC bend program. A different mode can be selected for each bend step allowing the operator to streamline set-up to suit the profile of the work piece. SmartLink automatically switches guarding modes on each step of the bend program with automatic blanking of the sensors to eliminate unnecessary stops and reduce cycle time to achieve maximum productivity.

Normal mode

In normal mode all sensors are active, allowing the tools to close safely at high speed. If any sensor is blocked, the machine is automatically stopped. If any sensor remains blocked then the bend can be completed at 10mm/s safe speed.

Tray mode

Tray mode is designed for bending tray or box shaped work pieces where the side flanges block the front or rear sensors. In tray mode all sensors are active and the machine is stopped if a side flange is detected. The operator presses the pedal again to confirm the presence of the side flange then the system automatically blanks the front and rear sensors and the bend continues at high speed.

Tray mode with programmed flange height

The operator has the option to program the height of the side flange in the bend program. During the cycle all sensors are active until the top of the flange is detected. The actual flange position is verified with the programmed position then the front and rear sensors are automatically blanked so the bend continues at high speed without stopping. Activation of the closing movement only requires a single pedal press and does not require any other operator confirmation (e.g. double pedal press). This function is CE Certified.

Mute stop mode

Ideal for forming parts with side flanges that block the entire sensing zone. The tools close at high speed and stop automatically at the mute-point allowing the operator to simply insert the work piece then press the pedal to complete the bend.

Back gauge mode

Back gauge mode is designed for bend cycles where the back gauge fingers are positioned very close to the bend line and detected by the rear sensor. To maintain protection while avoiding unnecessary interference the rear sensor is automatically blanked just above the back gauge fingers so the bend can be completed without stopping.

Field muted mode

In Field muted mode the optical protection is turned off and closing speed restricted to 10mm/s safe speed. Field muted mode is ideal for bending operations where the laser transmitter or receiver must be moved clear to accommodate work pieces that extend past the ends of the machine bed.

Dual guarding option

This provides the flexibility to install both optical laser protection and a third party light curtain on the same machine. The operator can select which guarding device to activate for a particular bend job or the system can automatically switch between guarding devices on a bend by bend basis.

Mounting Brackets

We offer an optional mounting bracket solutions for attaching the laser transmitter and receiver to the press brake. Vertical and horizontal brackets are available in multiple lengths to suit different machine and tooling configurations.

Standard Brackets

Standard Brackets are manufactured from an extruded high-tensile alloy for rigidity and tolerance to machine vibration with linear rails and bearings that provide precision vertical adjustment of the laser transmitter and receiver. During tool change a spring loaded locking pin keeps the transmitter and receiver clear allowing the tools to be easily removed from the ends of the machine.

After tool change the transmitter and receiver are easily adjusted to match the tool height with the process taking only a matter of seconds. Multiple vertical lengths and horizontal mounting options are available to suit most machines and the bracket system is designed to aesthetically combine well with modern press brake designs.

	Standard Brackets
Specifications	
Vertical bracket length	520mm / 700mm / 1000mm
Vertical adjustment range	350mm / 530mm / 830mm
Horizontal adjustment range	40mm
Maximum recommended machine length	8 metres
Main Features	
Precision linear bearings and rails	●
Free sliding operation	●
Adjustable locking handle	●
Spring loaded tool change lock	●

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