P1

Sustainable, compact bending solution

salvagnini

Versatile technology with high dynamics.

PRODUCTIVITY

How to combine productivity and flexibility?

Conventional bending is characterized by an average OEE of 30%, and flexibility depends on the tool change system, which is often costly and time-consuming, with longer times compared to panel benders, or on the installation of more than one press brake. The P1 compact electric panel bender natively combines productivity, with its automatic bending and handling cycles, and flexibility, with its universal bending tools.

How long does re-tooling take?

The P1 doesn't require re-tooling: the upper and lower blades, the counterblade and the blankholder are universal tools that are able to process the whole range of thicknesses and machinable materials.

Do manual loading and unloading affect the total cycle time?

Loading and unloading are performed by the operator, who positions the sheet metal on the worktable and collects the product after bending. The P1's cycle minimizes the impact of these activities on total cycle time, as it allows the product to be unloaded after positioning the sheet on the worktable, thus combining two operations in a single action.

Does the P1's set-up affect productivity?

The set-up has minimal impact on the panel bender's productivity: when the program is loaded, the blankholder automatically adapts in masked time, and the manipulator gets into position for gripping and handling the sheet.

How to produce in kits or batch-one?

The P1 is equipped with the ABA automatic blankholder, which automatically adapts the length of the tool according to the size of the part to be produced without the need for machine downtime or manual re-tooling even in-cycle: the ideal solution for batch-one and kit production.

How do we achieve high dynamics?

The very small masses involved and the optimized dimensions of the panel bender allow the bladeholder to reach a greater degree of freedom in its movements, and positions from where it can even make bends that would not be feasible on other panel benders. Furthermore, the electric drives and patented kinematics allow bending in less than 2 seconds.

The **P1** natively combines **productivity**, with its automatic bending and handling cycles, and **versatility**, with its universal bending tools and patented kinematics.

Intelligent system, consistent quality.

PRECISION

How to achieve maximum precision?

The sheet metal is centered, just once at the start of the process, against controlled reference stops: this minimizes the cycle time as well as any precision errors, which are all absorbed by the first bend. The bending formula automatically optimizes the bending parameters to reduce waste, while MAC3.0 detects and automatically compensates any variability in the material to guarantee precise, high-quality bends.

ADAPTIVITY

How to make production independent of changes in material?

MAC3.0 is the set of integrated technologies – sensors, formulas and algorithms – that make the panel bender intelligent: it eliminates waste and reduces corrections, measuring in-cycle and automatically compensating any variability in the material being machined.

How to make production independent of external variations?

The P1 integrates advanced sensors that measure the effective size of the part to be machined. The data are fed in real time into the bending formula, which defines the correct force to apply to the sheet metal, guaranteeing the precision, repeatability and quality of the finished product.

How to adapt the panel bender to different production needs?

With the bending unit's patented kinematics, the P1 panel bender can achieve bends and geometries that cannot be made on any other bending machine.

How to make the process reactive to changes in the production lists?

The P1 can be equipped with proprietary OPS software, which ensures communication between the panel bender and the factory ERP: depending on needs, OPS manages the production of sequences of different parts. Universal bending tools, in-cycle set-up and automatic handling allow the system to respond to any requests immediately.

Versatile and productive electric panel bender.

Adaptive system
The integrated adaptive technologies (advanced sensors, bending formula, MAC3.0) make the system intelligent and able to **automatically adapt** to changes in the material and the external environment, **eliminating waste and corrections**, and extending the range of products that can be made.

Flexible automation
It uses **universal bending** tools which automatically adapt in-cycle to the panel geometry, without machine down times or manual re-tooling, allowing **batch-one or kit productions.**

Connectivity 4.0
The proprietary **LINKS** and **OPS** softwares establish communication between the system and the company departments involved in the production flow.

Great versatility
With the bending unit's patented kinematics, the P1 panel bender **can bend a wide variety of items**, achieving bends that **cannot be made** on any other bending machine.

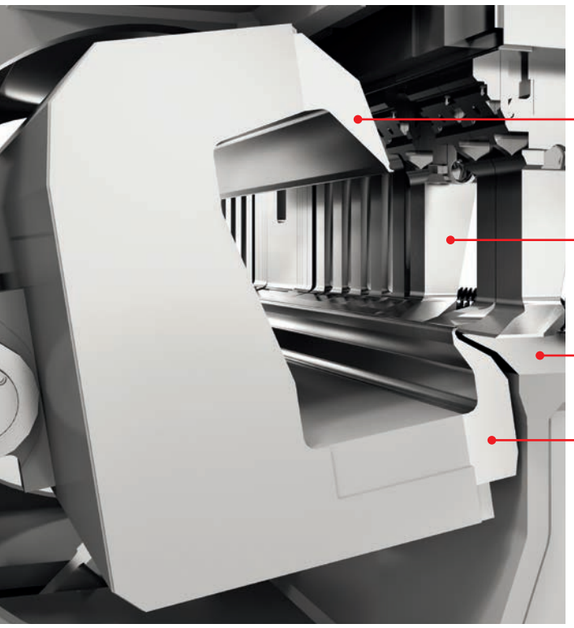
Sustainable technology
The technical solutions adopted, including the use of only pneumatic and electric actuators, allow it to **respect both people and the environment** without reducing productivity. The panel bender consumes **less than 3 kW** and has truly compact overall dimensions, of just **8 m²**.

Salvagnini is panel bending, panel bending is Salvagnini.

4,000 installations in 76 countries, the world's largest panel bender manufacturing plant and over 40 years of experience and competence speak for themselves: Salvagnini is an authority on "panel forming 4.0", a flexible process the likes of which has never been seen before, whose application boundaries are extended to sectors and environments that have always been considered poorly suited to this technology.

Flexible automation.

Upper and lower blade, counterblade and blankholder are the **four universal tools** used to process the whole range of thicknesses and machinable materials, from 0.4 to 1.6 mm, during the cycle and without machine down times or manual re-tooling.



The upper and lower blades (A, D) are the two tools that feature interpolated controlled movement and are responsible for bending.

The ABA automatic **blankholder (B)** works simultaneously with the blades and counterblade to bend and clamp the sheet accurately and effectively. It adapts the tool length according to the size of the part being produced during the cycle, without machine down times or manual re-tooling. The tool profile allows inward bends up to 45 mm.

The **counterblade (C)** helps clamp the sheet during the cycle.

Automatic manipulator: fast and accurate.

Quickly and fully automatically, this moves, handles, grips and rotates the sheet metal throughout the whole machining cycle. **It requires no manual interventions during the cycle.** The operator positions the sheet metal on the worktable and collects the product after bending, performing only the loading and unloading operations.

Operating mode: simple, quick and lean.

Bending on each side of the sheet is achieved thanks to controlled, **interpolated movements** of **blades** installed on a bladeholder that features patented kinematics.

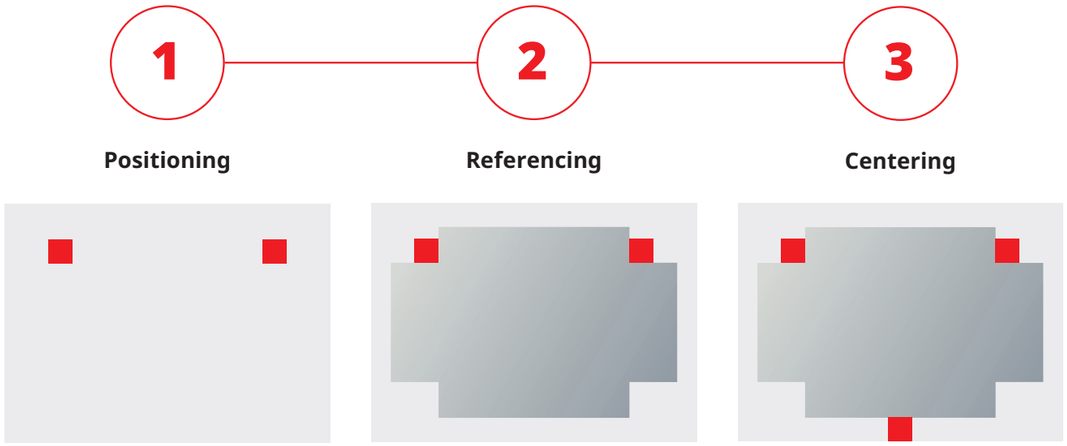
Downward bend
NEGATIVE

Upward bend
POSITIVE

Patented kinematics
BLADEHOLDER

Adaptive system.

One single and controlled centering process
The sheet metal is centered, just once at the start of the process, against controlled mechanical stops: the cycle time is minimized and any precision errors are all absorbed by the first bend. The mechanical stops are a further guarantee of finished panels of the correct size, every time.

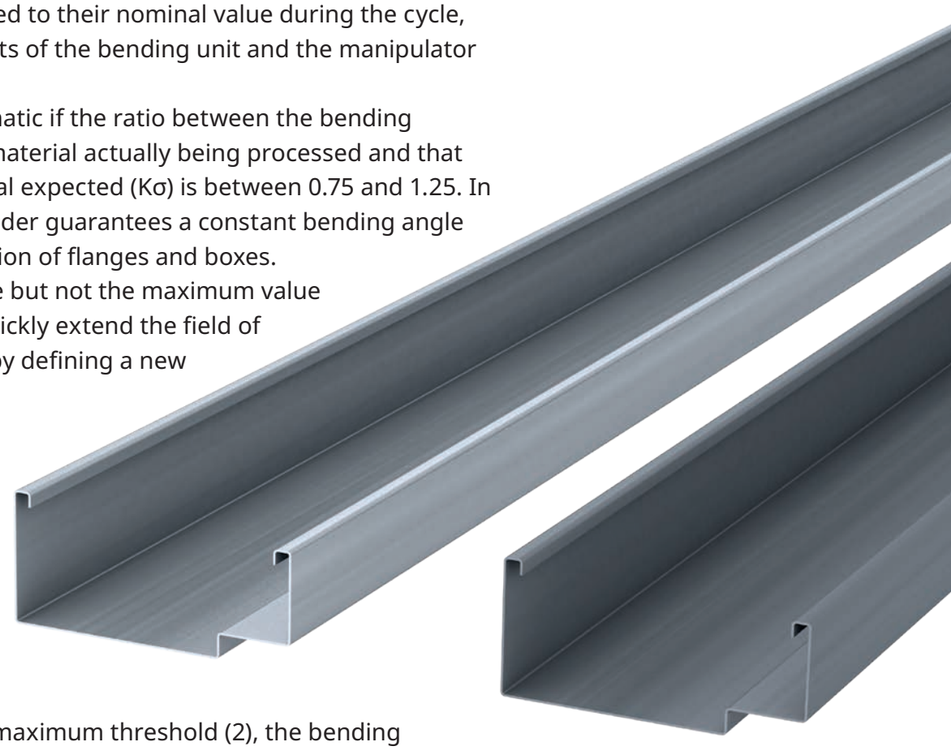


Proprietary bending formula

Developed over the years, the bending formula defines the force and manages the movements of the universal tools, analyzing different parameters in real time, including deflections, temperature and thickness, guaranteeing the precision, repeatability and quality of the finished product.

MAC3.0

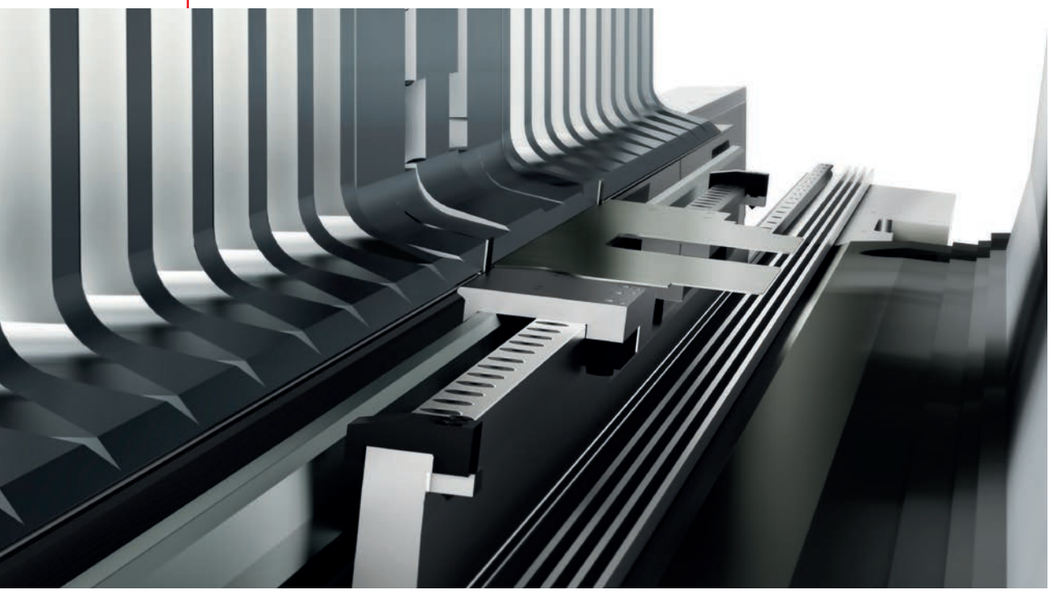
MAC3.0 detects any differences in the mechanical characteristics of the material compared to their nominal value during the cycle, adapting the movements of the bending unit and the manipulator to compensate them.
Compensation is automatic if the ratio between the bending force required for the material actually being processed and that required for the material expected (Kσ) is between 0.75 and 1.25. In this case, the panel bender guarantees a constant bending angle and the correct dimension of flanges and boxes.
If Kσ exceeds this range but not the maximum value (2), the operator can quickly extend the field of application of MAC3.0 by defining a new material.

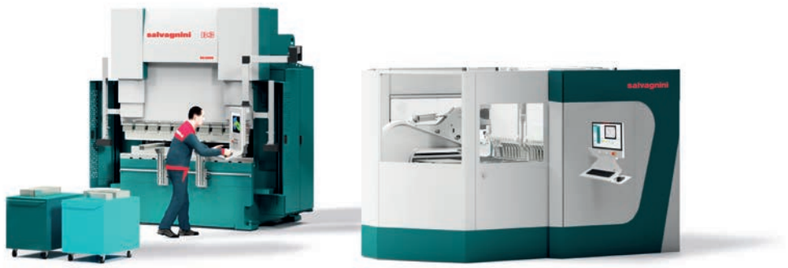


For values beyond the maximum threshold (2), the bending process is interrupted automatically.
A digital indicator integrated in FACE monitors the situation in real time, informing the operator of the actual characteristics of the material being machined.

Production versatility.

CLA tools: auxiliary blades, modular in length, available in both positive and negative versions, for making upward or downward tabs. They engage and disengage between the sheet metal and the blades, quickly and automatically, to make bends that are shorter than the whole sheet length.





Flexcell was designed by Salvagnini to satisfy the growing requirements for flexibility and productivity: the machining cell is the ideal solution for variable and diversified production, and in one of its configurations allows the P1 panel bender to work alongside the B3 press brake.

Sustainable technology.

Optimized structure
Using the most innovative technology available on the market, the machine structure has been optimized down to the finest detail - from weight to architecture, from precision machining to engineering - making the P1 100% electric and minimizing consumption.

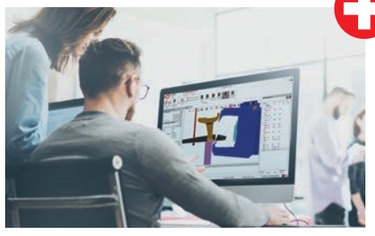
Reduced consumption. The panel bender adopts only electric actuators, thus removing the hydraulics and guaranteeing maximum consumption of 3kW.

Evolved programming.

STREAM

STREAM is Salvagnini's answer to the modern industrial context, a programming suite that improves reactivity and reduces costs, operating errors and process inefficiencies.

Industry has changed: flexibility and efficiency are fundamental requirements for managing increasingly smaller batches or rapid part code turnover. STREAM is Salvagnini's answer to the modern industrial context, a programming suite that improves reactivity and reduces costs, operating errors and process inefficiencies. STREAM is the integrated environment for managing all activities in the office and on the factory floor, the only point of access for all technologies, from cutting to bending, meeting all planning, programming, production, management, control and optimization needs throughout the production process. Moreover STREAM can be used to calculate costs, including upstream and downstream processes where necessary. It is structured on three levels: technical, productive and business.

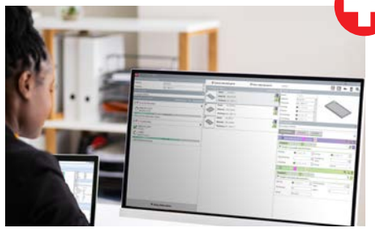


STREAM BEND

STREAMBEND is the software for developing panel bending programs, even for multiple parts:

- in automatic mode, it develops programs independently, starting from a 3D model;
- in interactive mode, it is used for generation/editing/completion operations.

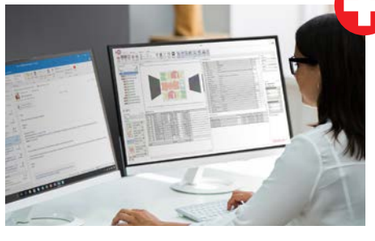
It includes a simulator that can assess the results obtained on the machine.



PARTS

PARTS is the software used to manage the whole database of products and parts:

- it classifies the elements according to common or customized categories;
- it defines the production flows for each part to be machined;
- it generates the relative programs.



VALUES

VALUES is the software which provides an accurate estimation of production costs. It allows calculation not only on the basis of the individual technology, but also over the entire process, including upstream and downstream machining where necessary.

Tools for digital factories.

OPS

Coordinate your factory with OPS in real time.
OPS is the Salvagnini modular production management software, used to exchange information in real time between the panel bender and the factory ERP/MRP.

OPS **can take independent decisions,** according to a production logic – or a mix of multiple production logics – designed to meet the customer's production needs, transformed into an algorithm.
It is also used to exchange information between different technologies, such as the components of an FMC cell, so as to optimize production flows and increase productivity. The digital connection between different systems, and the easy-to-use software solutions, also help to maximize the production capacity available, increasing technology flexibility and overall factory efficiency.

LINKS: IoT to serve efficiency

LINKS is Salvagnini's IoT solution that monitors the **performance of the panel bender**. It offers access to production data, logbooks, performance KPIs and telemetry, as well as parameter monitoring by the Condition Monitoring process, thus increasing the overall equipment efficiency.

LINKS

Compact and versatile.

TECHNICAL SPECIFICATIONS	P1
Maximum length of incoming sheet (mm)	1575
Maximum width of incoming sheet (mm)	1000
Maximum diagonal that can be rotated (mm)	1600
Maximum bending force (kN)	90
Maximum sheet bending force (kN)	310
Maximum bending length (mm)	1250
Maximum bending height (mm)	127
Minimum thickness (mm)	0.4
Maximum thickness and bending angle steel, UTS 410 N/mm² (mm)	1.60 (±90°) 1.30 (±130°)
Maximum thickness and bending angle stainless steel, UTS 660 N/mm² (mm)	1.30 (±90°) 1.10 (±120°)
Maximum thickness and bending angle aluminium, UTS 265 N/mm² (mm)	1.60 (±90°) 1.30 (±130°)
Average consumption (kW)	3.0
Noise level (Machine Directive 2006/42/EC) (dB)	64

Values refer to a standard machine. Salvagnini reserves the right to modify this data without warning.

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