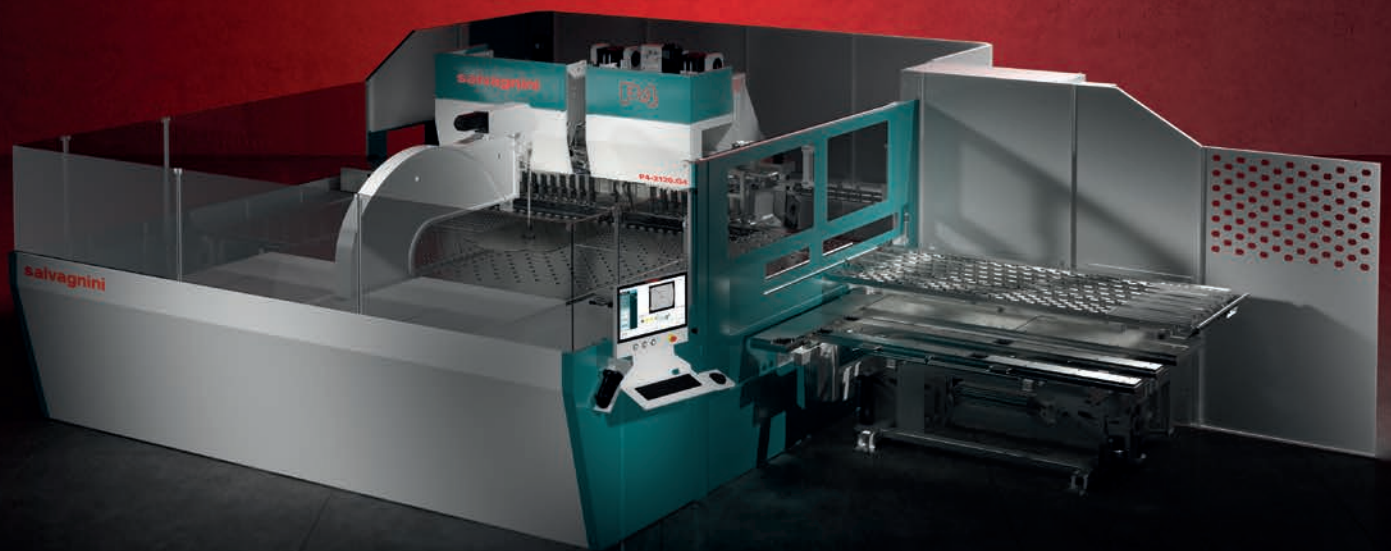# P4.G4

**Range of automatic
panel benders**

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The winning solution for shaping sheet metal.

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PRODUCTIVITY

How to combine productivity and flexibility?

Conventional bending is characterized by an average OEE of 30%, with flexibility dependent on the tool change system - which is often costly and more time-consuming than on a panel bender - or on the installation of more than one press brake. The P4.G4 panel bender, on the other hand, natively combines productivity, with its automatic bending and handling cycles, and flexibility, with its universal bending tools. And with its advanced cycles, the P4.G4 completes an average of 17 bends per minute.

How long does re-tooling take?

The P4.G4 panel bender doesn't need 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.

What is the best configuration?

With its 6 models available, Salvagnini offers the widest range of panel benders on the market today. Each of these models can be configured and customized with many options, to respond to many different production needs. After a feasibility study made on the key parts to be produced, Salvagnini can drive each customer in the choice of the most suitable panel bender, according to variables including production strategies, field of application, level of automation required for loading and unloading semi-finished parts, options for achieving full versatility and, if necessary, types of auxiliary technologies such as cutting, punching and press bending, allowing the panel bender to express its productivity to the full.

How to produce in kits or batch-one?

The P4.G4 is equipped with an 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.

The **P4.G4** natively combines **productivity**, with its automatic bending and handling cycles, and **flexibility**, with its universal bending tools.

2

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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?

Each P4.G4 panel bender integrates advanced sensors that measure the material thickness and the real size of the blank, and detects any deformations caused by variations in temperature. 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.

Smart system, constant quality.

How to adapt the panel bender to different production needs?

In addition to the automatic blankholder, the P4.G4 offers a range of options to guarantee maximum versatility and adaptability, to suit any production strategy or mix.

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

P4.G4 is the ideal bending solution for flexible line or cell production. It 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, automatic in-cycle set-up and automatic handling allow the system to respond to any requests immediately.

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.

The panel bender
of the future, available today.

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.**

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.

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

Production versatility
It offers **customized solutions,** including **auxiliary tools** and **additional devices** for special geometries or **different loading/unloading solutions.**

Sustainable technology
The technical solutions adopted (Direct Drive and pneumatic and electric actuators) allow it to **respect both people and the environment** without reducing its productivity.
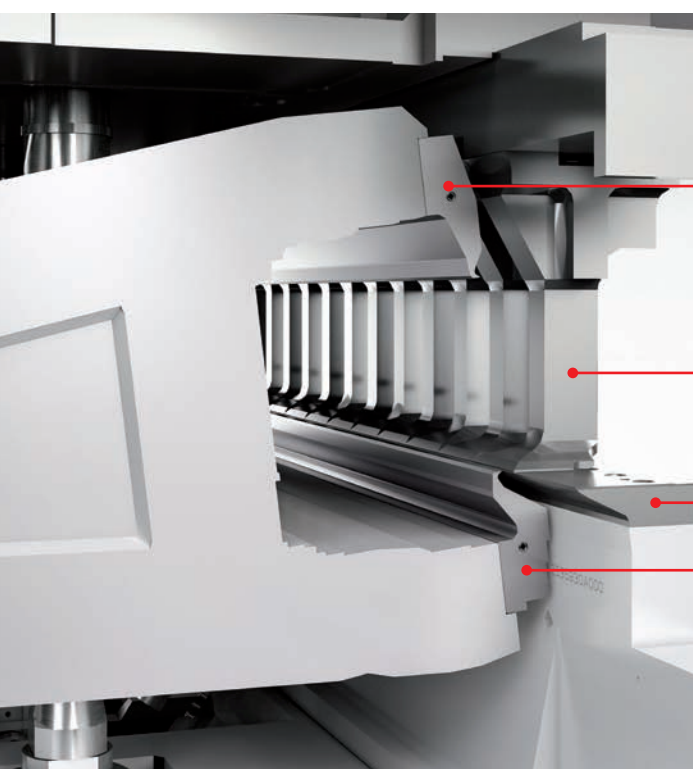
Salvagnini is panel bending, panel bending is Salvagnini.

4,000 installations in 85 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.

The loading/unloading devices available allow each P4.G4 panel bender **to be configured** for working stand-alone or in-line or to be integrated into a flexible manufacturing cell or an automated factory.

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 0.5 to 3.2 mm, during the cycle and without machine down times or manual re-tooling.

Operating mode: simple, quick and lean.

The bending on each side of the sheet is achieved thanks to the **controlled interpolated blade movements.**

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

(B) The 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 65 mm.
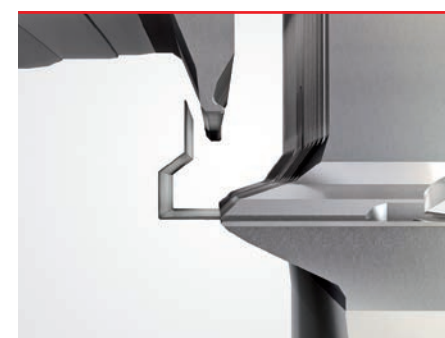
(C)

(D) The **counterblade (C)** helps to 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.**
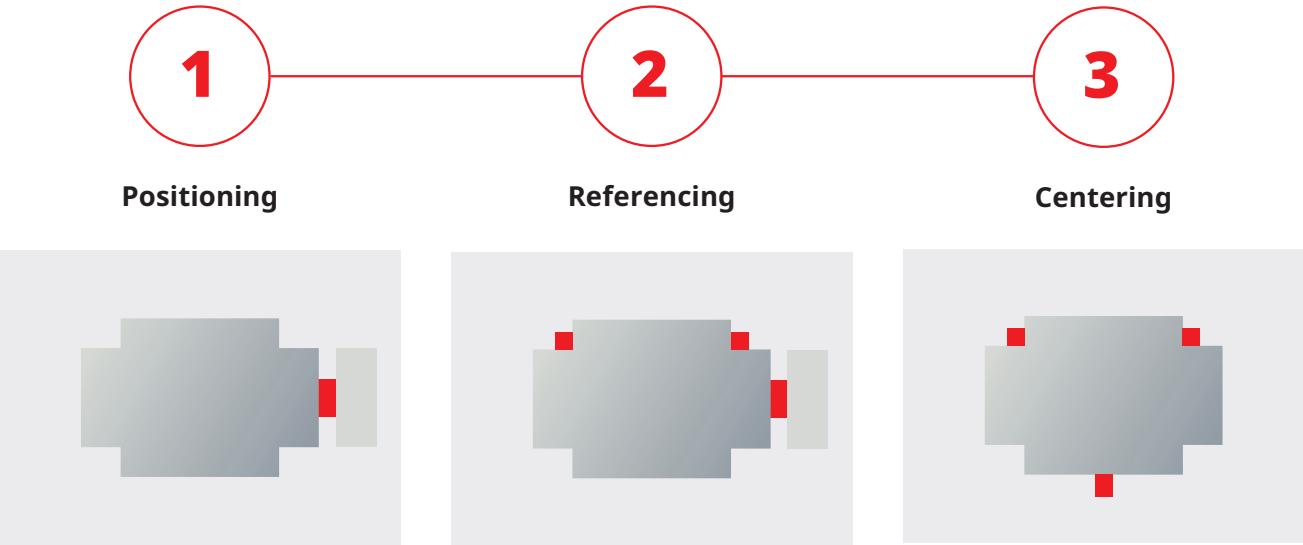
Downward bend
NEGATIVE

Upward bend
POSITIVE

Safe-edge bend
WITH BLADE

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.

1	2	3
Positioning	Referencing	Centering

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, 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.

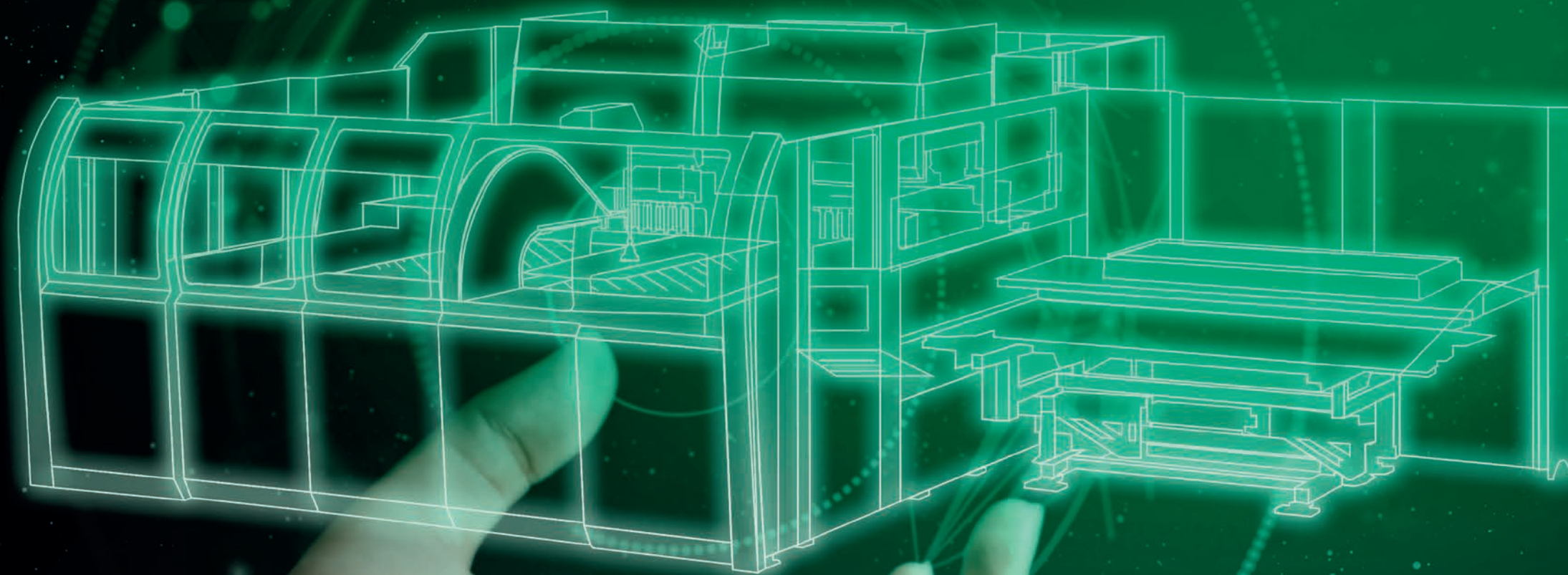TECHNOLOGY   MACHINE   MATERIAL

DIRECT DRIVES

The panel bender adopts only electric actuators, thus removing the hydraulics. Bending cylinders are driven by brushless motors, which offers great advantages in terms of the reduced wear and deterioration of components that, unlike in other similar technologies, are no longer subjected to continuous extreme mechanical stress.
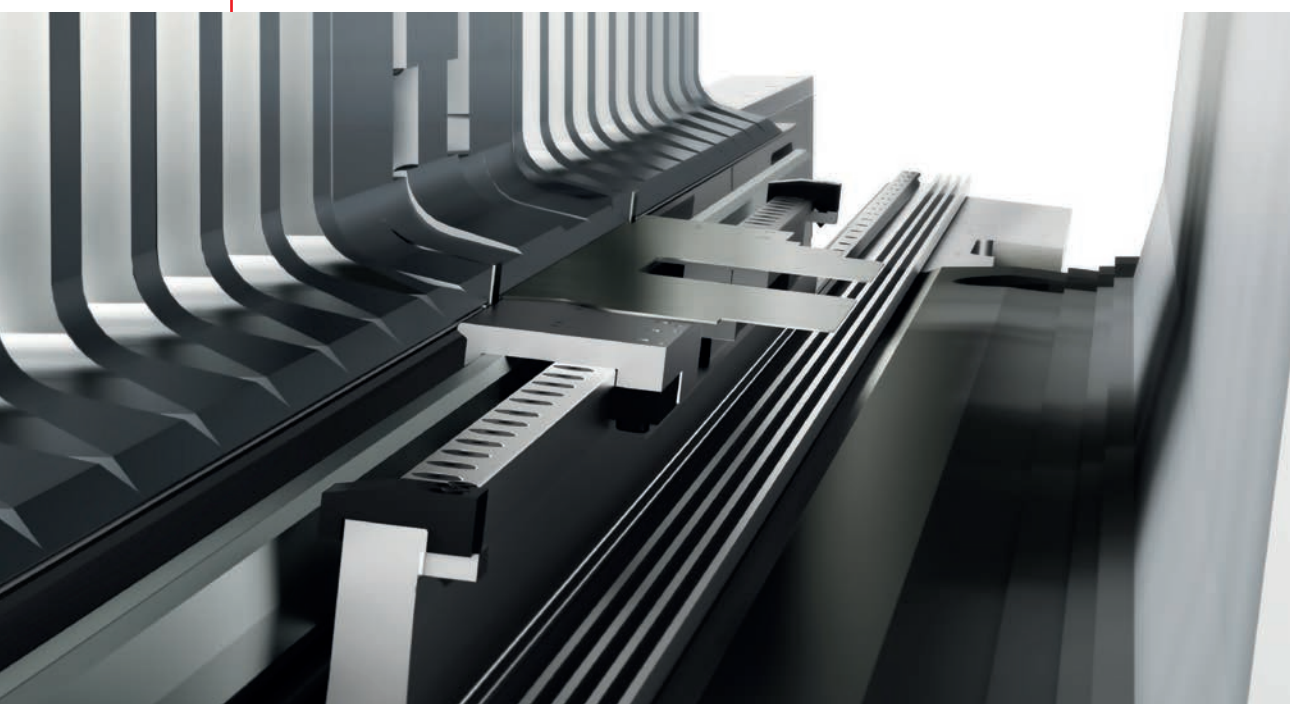
Sustainable technology.

Intelligent energy use.
The masked-time cycles and smart drives allow all the absorbed energy to be used **with maximum efficiency**.

Custom solutions to widen versatility.

T/P tools: auxiliary tools that can be engaged and disengaged beneath the blankholder, rapidly and automatically, to handle narrow panels or make tubular, hidden or radius bends or bends with intrusive embossings.

CUT tools: specific T/P tool, consisting of a cutting blade that overlaps the lower bending blade and an evacuation device for automatic and sequential cutting of **profiles with different lengths, materials and thicknesses**, starting from a single sheet; it makes separation cuts after each free bending sequence.

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. Auxiliary blades can be set up manually or automatically, with the CLA/SIM option, which composes sequences of different lengths in masked time.
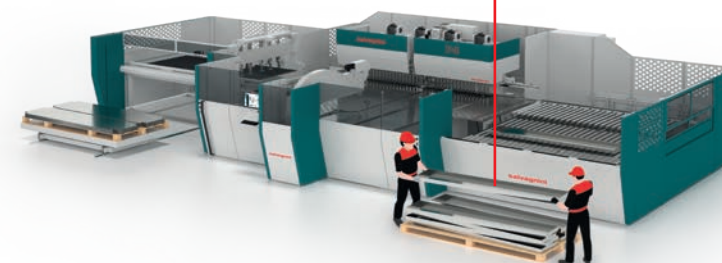
Made-to-measure modularity.

P4.G4 can be fed manually or automatically, picking the sheets up from one or more sheet metal packs and feeding the machine in masked time. Even with production solutions that work in-line, the results are balanced and optimized for all the intermediate stations.
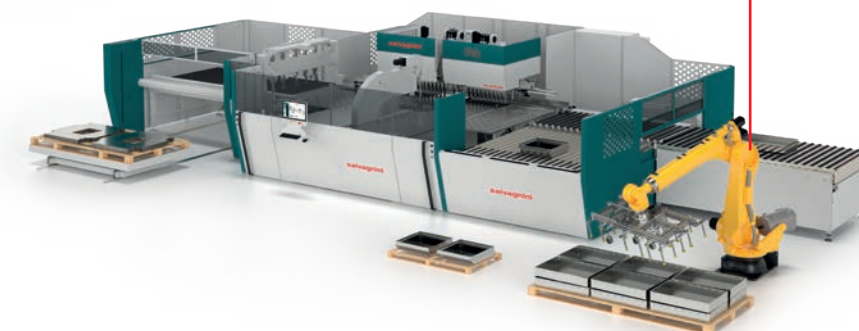**P4.G4** can also be equipped with different unloading devices, **manual or robotized.**

Manual unloading:
the bent part is handled and picked up by an operator.

Robotized unloading with palletization:
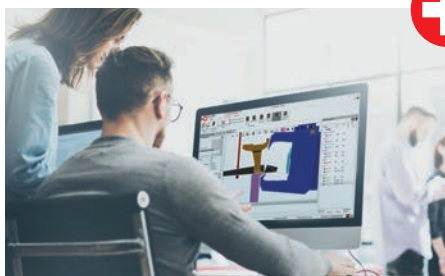the parts produced are handled by a robot.

The human-friendly software suite.

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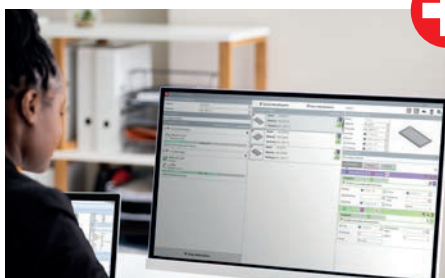 office and on the factory floor, the only point of access for all technologies, from cutting to bending, meeting all planning, programming, production, management, control and optimization needs throughout the production process. Moreover STREAM can be used to calculate costs, including upstream and downstream processes where necessary.
It is structured on three levels: technical, productive and business.

STREAMBEND

STREAMBEND is the software for developing panel bending programs, including 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. Depending on the installed modules, OPS can:

Organize and manage production, defining the priorities, managing any order changes or cancellations, and checking the availability of the raw materials or semi-finished parts needed for production;

Automatically create machine programs;

Provide feedback to the factory ERP, updating material availability and state of production in real time, part by part;

Reduce or eliminate any redundant activities with low added value.

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

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.

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Choose your size.

Salvagnini supplies 8 different models, which bend up to **4000 mm in length and 350 mm in height**, responding to all production needs and maximizing use of the panel bender.

Technical specifications	P4-2120.G4	P4-2226.G4	P4-2520.G4	P4-2535.G4	P4-2720.G4	P4-3126.G4	P4-3220.G4	P4-4020.G4		
Maximum length of incoming sheet (mm)	2495	2815	3050	3495	3050	3495	3850	4000		
Maximum width of incoming sheet (mm)	1524	1524	1524	1524	1524	1524	1524	1524		
Maximum diagonal that can be rotated (mm)	2500	2820	3200	3500	3200	3500	4000	4280		
Maximum bending force (kN)	330	590	660	660	660	625	660	660		
Maximum clamping force (kN)	530	635	1060	1060	1060	825	1060	1060		
Maximum bending length (mm)	2180	2200	2500	2500	2750	3100	3200	400-3200	3200-3850	3850-4000
Maximum bending height (mm)	203	260	203	350	203	260	203	203	203	203
Minimum thickness (mm)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
Maximum thickness and bending angle steel, UTS 410 N/mm^2 (mm)	3.2 (±90°) 2.5 (±120°) 2.1 (±135°)	3.2 (±90°) 2.5 (±130°) 2.1 (±135°)	3.2 (±90°) 2.5 (±130°) 2.1 (±135°)	2.5 (±90°) 2.1 (±135°)	3.2 (±90°) 2.5 (±130°) 2.1 (±135°)	3.2 (±90°) 2.5 (±130°) 2.1 (±135°)	3.2 (±90°) 2.5 (±130°) 2.1 (±135°)	3.2 (±90°) 2.5 (±130°) 2.1 (±135°)	2.5 (±125°) 2.1 (±130°) 1.6 (±135°)	1.6 (±130°)
Maximum thickness and bending angle stainless steel, UTS 660 N/mm^2 (mm)	2.5 (±90°) 2.1 (±120°) 1.6 (±130°)	2.5 (±90°) 2.1 (±125°) 1.6 (±135°)	2.5 (±90°) 2.1 (±125°) 1.6 (±135°)	2.1 (±90°) 1.6 (±130°)	2.5 (±90°) 2.1 (±125°) 1.6 (±135°)	2.5 (±90°) 2.1 (±125°) 1.6 (±135°)	2.5 (±90°) 2.1 (±125°) 1.6 (±135°)	2.5 (±90°) 2.1 (±125°) 1.6 (±135°)		1.3 (±120°)
Maximum thickness and bending angle aluminium, UTS 265 N/mm^2 (mm)	4.0 (±120°) 3.5 (±130°)	4.0 (±120°) 3.5 (±130°) 3.0 (±135°)	4.0 (±120°) 3.5 (±130°) 3.0 (±135°)	3.2 (±120°) 2.5 (±130°)	4.0 (±120°) 3.5 (±130°) 3.0 (±135°)	4.0 (±120°) 3.5 (±130°) 3.0 (±135°)	4.0 (±120°) 3.5 (±130°) 3.0 (±135°)	4.0 (±120°) 3.5 (±130°) 3.0 (±135°)		2.5 (±125°)

Values refer to standard machines. Salvagnini reserves the right to modify this data without prior notice.

P4-2720.G4
P4-2535.G4
P4-2520.G4

P4-4020.G4

(M) —— (L) —— (XL) —— (XXL)

P4-2120.G4
P4-2226.G4

P4-3126.G4
P4-3220.G4

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P1 —— S

M —— PX

P2-1620.G4
P2-2120.G4
P2-2226.G4
P2-2720.G4
P4-2120.G4
P4-2226.G4

M

P2-2520.G4
P4-2520.G4
P4-2535.G4
P4-2720.G4

L

P4-3126.G4
P4-3220.G4

XL

XXL —— **P4**-4020.G4