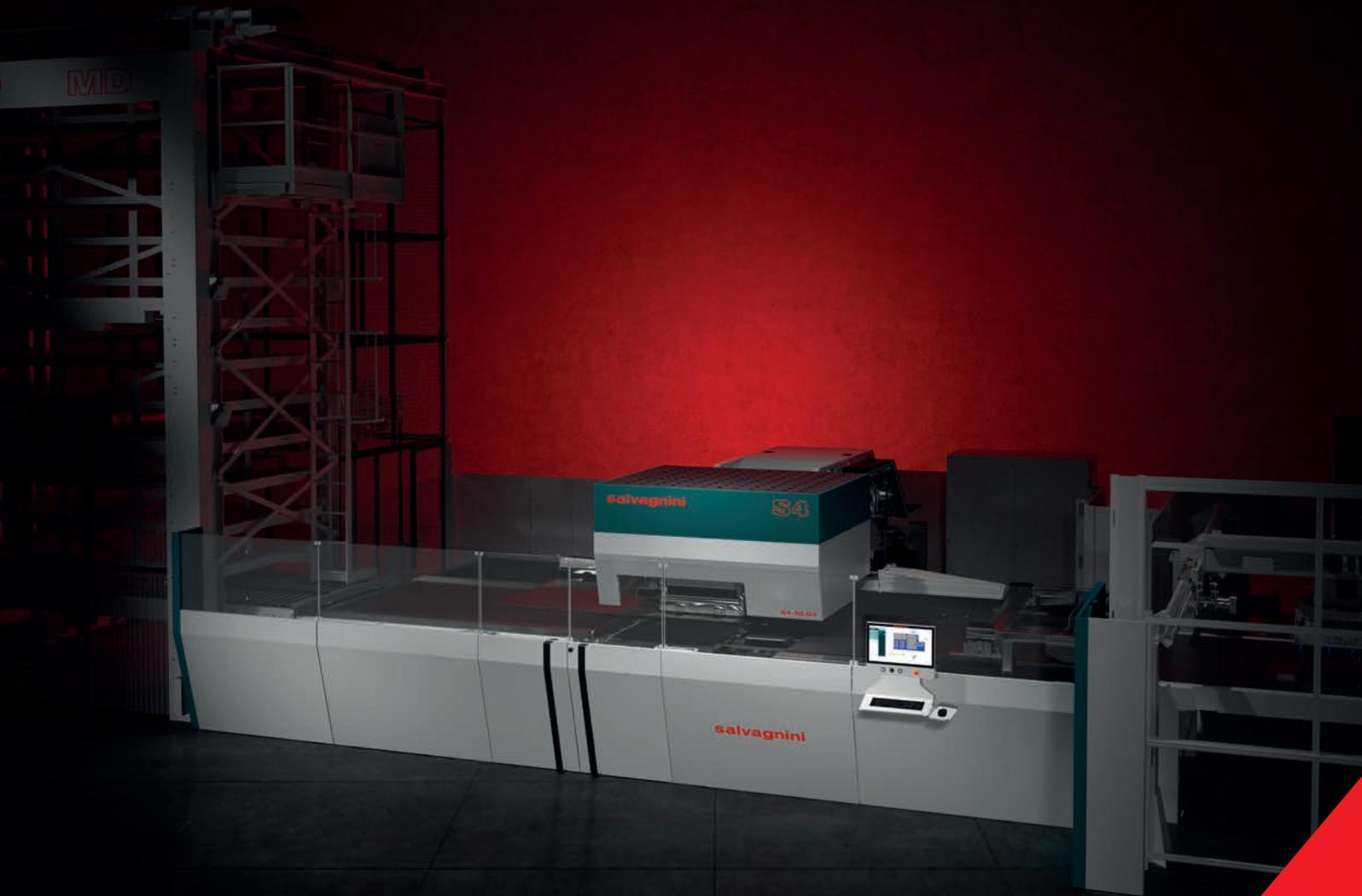


S4.G4



**Advanced hybrid technology
punching-shearing center**

salvagnini

CHANGING

What are the challenges faced by companies today?

Today companies have to cope with many challenges in order to remain competitive in a continuously developing market. These challenges include:

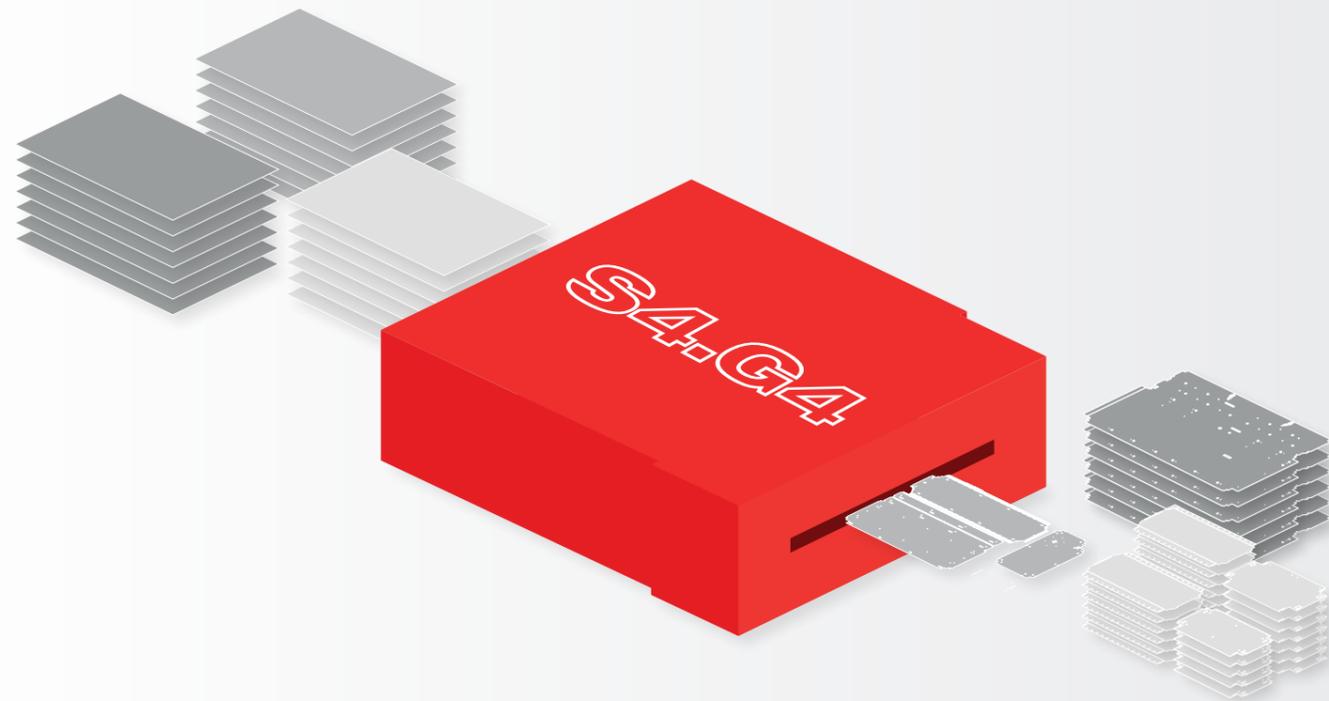
1. The need to automate information distribution, in order to create a **lean, error-proof production environment**, by integrating company ERP/MRP systems with process software for production management.
2. The growing need to **increase the autonomy and efficiency of production systems** by automating loading, unloading and sorting operations.
3. Finally, to prevent programming from becoming a bottleneck for production, the aim of **implementing simple and quick office software solutions**, able to make procedures leaner and improve overall efficiency.

What is Salvagnini's perspective on punching?

For Salvagnini, punching is always a **combined process of forming and separating parts**, with the separation done either by shear or by laser. The Salvagnini **S4.G4 punching-shearing machine** is the ideal solution for businesses looking for **productivity, flexibility, reactivity and efficiency**. The S4.G4 performs all the part punching, forming and separation operations **by subtraction**, destroying the skeleton to ensure that the parts flow progressively downstream: this eliminates the need for regripping and rapidly feeds the next production step. Part separation integrates the punching machine in a modern and efficient production flow, able to feed the workstations downstream, such as the panel bender.

How can we justify the investment?

Part geometries, increasingly small batch sizes, cutting quality and expected productivity are all factors that make the investment in an S4.G4 more attractive than that in a traditional punching machine. High productivity is guaranteed because the S4.G4 is a **single work center**, able to automatically produce finished parts **without the need for re-machining and/or re-tooling**. It is the winning solution in production contexts in which **lead times have to be minimized**, because the integration of forming and separation processes drastically reduces throughput times. The S4.G4 is the **ideal solution** in sectors requiring **parametric jobs**: more flexible than a laser, it drastically simplifies programming and reduces overall process times, from product design to production.



What is the Salvagnini formula for maximum productivity?

The S4.G4 **natively integrates the punching and separation operations and automatically manages the feeding, sorting and unloading cycles** which, when possible, are performed in masked time. With the patented multi-press head, the tools are always available for nesting and multiple jobs. The proprietary Punch&Cut algorithm optimizes the integrated shearing cuts for separating the single parts of the workpiece in a fast, flexible and automatic sequence with no waiting times.

How to combine productivity and flexibility?

With conventional punching, productivity and flexibility depend on the number of tool changes in-cycle and the times for moving the sheet underneath the turret or single punch, and are influenced by the time required for the separation operations downstream. The S4.G4, on the other hand, natively combines **productivity and flexibility**. Helping to maximize **productivity** are the multi-press head, which requires no re-tooling in cycle, the modulated dynamics of the manipulator with 9 independent pincers and the integrated shear, which works in Punch&Cut mode. These unique solutions also improve the **flexibility** of the S4.G4 as – whatever the geometries and materials being machined – they produce large batches, kits or batch one with equal ease.

How long does re-tooling take?

The multi-press head, a distinctive feature of Salvagnini punching machines, **requires no re-tooling or tool changes** in-cycle, reducing overall processing times.

Is the S4.G4 punching machine a sustainable solution?

Salvagnini has always worked to produce solutions with low environmental impacts, guaranteeing maximum operator safety and resource optimization.

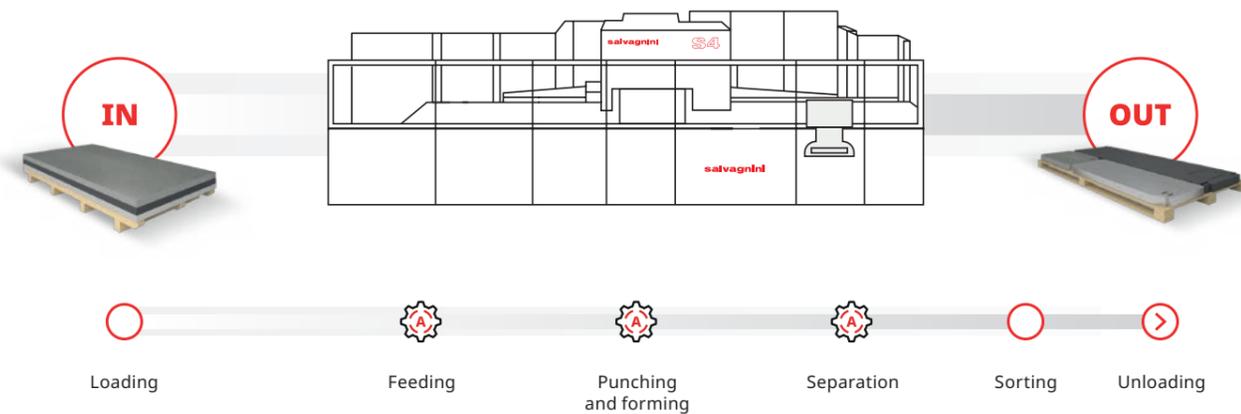
S4.G4 implements differentiating solutions that reduce consumption while guaranteeing the same performance and reliability, as they are based on successful applications borrowed from other product lines.

S4.G4 is equipped with **advanced hybrid actuators**: a proprietary solution used to reduce average consumption by up to 20% compared to the corresponding electrical solutions. This original solution has made it possible to eliminate mechanical parts, to the benefit of a structural simplification that eliminates maintenance due to worn moving parts in electrical actuators, and guarantees extremely stable performance and at 100% in stress tests. In addition, this solution does not require a cooling system, as there are no moving parts that could overheat, so further **reducing consumption, today the lowest on the market for punching-shearing centers**.

The head is **extremely accessible** for simple and agile tool change and extraction, meeting not only the user's requests but also the ergonomic usage requirements set by the current standards.

The adaptive technologies, closed-chain controls, sensors and proprietary solutions assure that the materials are used in the best way, with zero waste by effectively reducing scrap.

FSL and unmanned manufacturing.



Multi-function system for lights-out manufacturing.

What is the minimum level of automation for an S4.G4?

The S4.G4 is a **flow solution**. In its basic configuration, it integrates feeding and unloading solutions that automate the production process and optimize each operation: at the infeed, a conveyor-centering device anticipates the loading of the sheet metal in masked time, positioning it correctly; at the outfeed, each part is automatically transferred to the next devices or the collection bins.

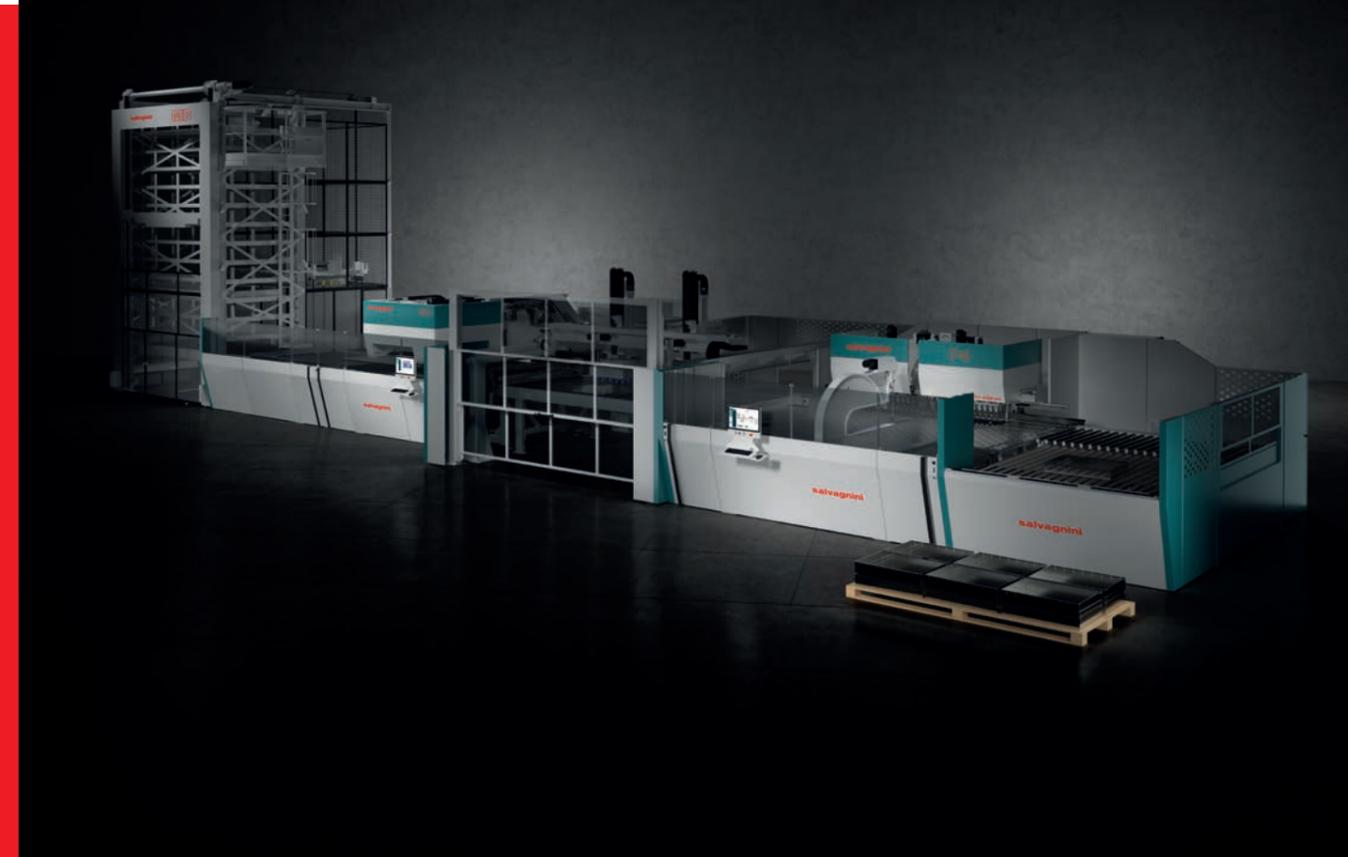
How can we recover efficiency?

In addition to solutions that optimize the efficiency of each operation, Salvagnini supplies automation and process software which, by suitably organizing the whole production flow, help to achieve greater autonomy for unmanned and lights-out jobs, reducing the impact of labor costs and the return-on-investment time.

Integrated modularity

The S4.G4 is easy to configure and can work stand-alone, in-line, integrated into a flexible cell or for lights-out manufacturing.

- The loading/unloading solutions allow unmanned operations, enhancing the productivity of the punching-shearing center.
- The modularity of Salvagnini's automation devices allows the production flow to be extended and/or modified, even after first installation.
- In addition to integrated automation, Salvagnini supplies a wide range of automatic loading/unloading and sorting devices which, coupled with a store, increase system autonomy and efficiency. These devices mean that different materials and thicknesses are always available for just-in-time jobs, minimizing waiting times for sheet metal feeding and reducing the risk of error or damage to the material resulting from human intervention.



The S4.G4 punching-shearing center is ideal for line configurations.

Presented in 1979, the S4+P4 line, combining an S4.G4 shear-punching machine and a P4 panel bender, represents one of the most valuable Salvagnini proposals. The evolution of technologies, software, the range of automations and experience gained in 45 years in many industrial sectors, make it an extremely versatile and modular solution that responds to different production needs.

The Flexible Smart Line (FSL) S4+P4 is the latest frontier in the Salvagnini range as it works by integrating physical realities - machinery and people - and virtual realities - the universe of big data - in a single ecosystem that respects both humans and the environment.

FSL is able to analyze data, interpret them and acquire useful information for implementing safe and intelligent production flows; it communicates with the external environment and can work in harmony with other functions in the supply chain, reducing scrap, waste and consumption in full safety.

Mechanical connection is guaranteed by various handling and transfer devices, while the software ensures two-way communication between systems, for unmanned and/or balanced production.

Experience and innovation.

Process efficiency

The S4.G4 punching-shearing center maximizes process efficiency: all the loading, punching, forming, separation and unloading operations are automatic, done by a single system that eliminates semi-finished parts, does not require manual intervention and assures extreme repeatability.



Adaptive system

The integrated adaptive technologies make the system intelligent and able to automatically adapt to variations, eliminating waste and corrections, while guaranteeing high machining quality and process reliability:

- the advanced hybrid actuator solution progressively delivers energy, modulating consumption according to the machining to perform, the material to punch and the required force.
- the centering control system measures the incoming sheet and adapts the program to the actual dimensions measured, if necessary;
- the manipulator changes its dynamics according to the size and weight of the sheet, controlling the programmable opening of the pincers according to the percentage of sheet machined;
- an automatic system checks the thermal expansion of the manipulator's axes and compensates any variations, guaranteeing extreme positioning precision;
- the shear automatically records the clearance and, depending on the thickness and the material, modulates the required force in-cycle.



Modular automation

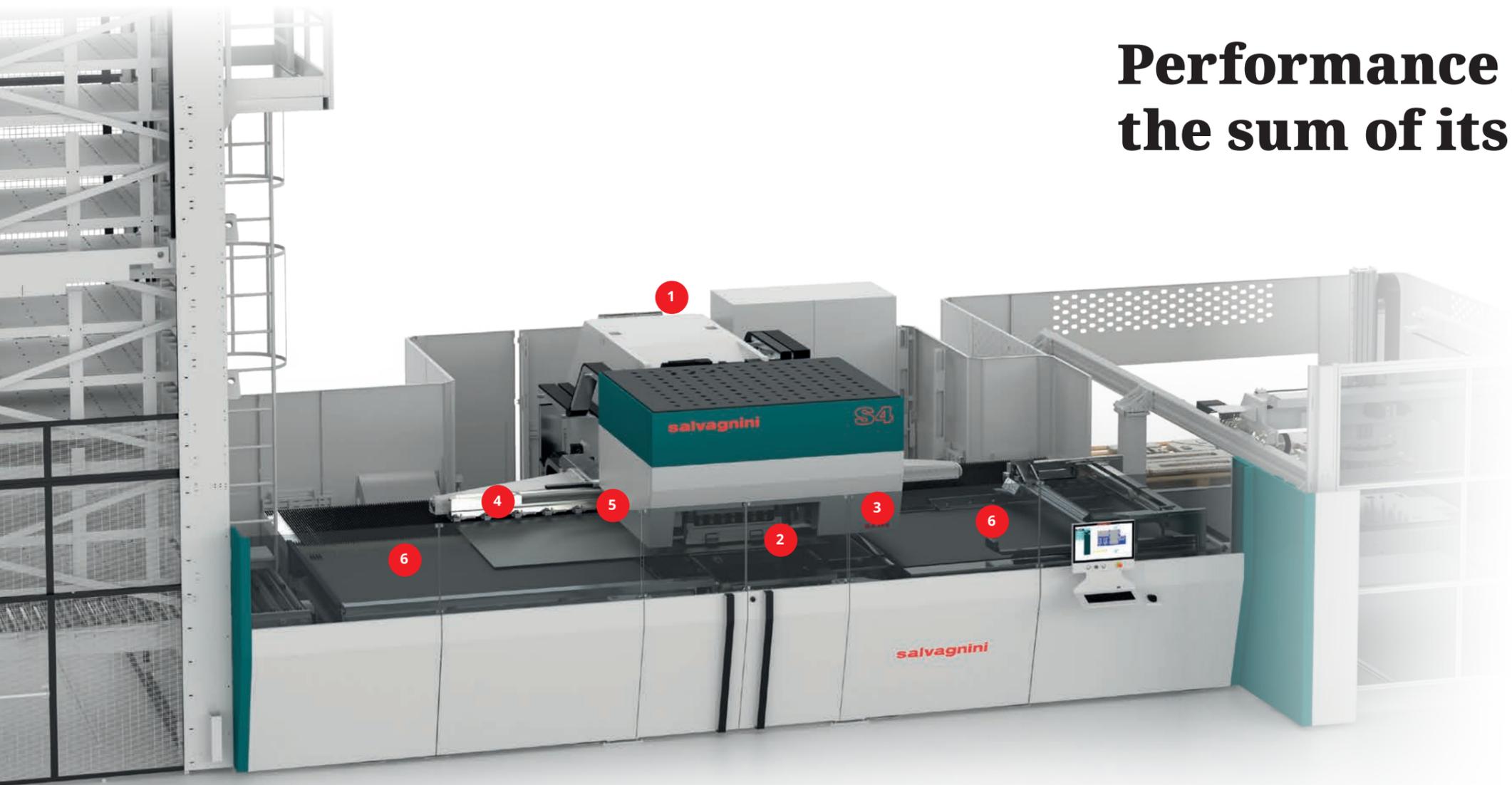
Storage and automatic loading/unloading devices increase the autonomy of the system, regaining efficiency both in individual processing steps and throughout the production process. The wide range meets practically any layout or configuration requirements, adapting to the most diverse production strategies.



The S4.G4 punching-shearing center has been a winning choice for companies in 66 countries worldwide and in over 110 sectors: from elevators to switchboards, from HVAC to metal furniture, from doors to lighting, from Ho.Re.Ca to logistics systems, from refrigeration to machinery, from building technologies to the automotive industry, and many more besides.

Designed by Guido Salvagnini in 1978, the S4 punching-shearing center is natively developed for integration into automatic manufacturing systems or lines.

Performance greater than the sum of its parts.



- 1 Structure
- 2 Multi-press head
- 3 Shear
- 4 Manipulator
- 5 Rotator
- 6 Working table

TECHNICAL DATA		
Models	S4-30.G4	S4-40.G4
Maximum sheet dimensions (mm)	3048 x 1650	4064 x 1650
Maximum sheet diagonal (mm)	3650	4655
Minimum sheet dimensions (mm)	600 x 400	600 x 400
Maximum speed (m/min):		
X axis	132	132
Y axis	117	117
Speed with both axes moving simultaneously (m/min)	176	176
Maximum acceleration (m/s²):		
X axis	30	30
Y axis	17	17

TECHNICAL DATA		
	Punching	Shearing
Technology	Operating head	Simultaneous or independent X- and Y-axis cutting
Maximum material thickness (mm)		
Aluminum, UTS 265 N/mm ²	5.0 (no multitool)	5.0
Steel, UTS 410 N/mm ²	4.0 (no multitool)	3.5
Stainless steel, UTS 610 N/mm ²	4.0 (no multitool)	2.0
Minimum material thickness (mm)	0.5	0.5

Multi-press head: tools always available.



The multi-press head has a **die structure** housing **up to 117** thick turret tools in **stations B, C and D**, the latter with a maximum force of **30 tons**, all with a **9 mm sharpening margin** and all available on the area of the largest sheet. The head can also mount lower cylinders and, on station D, **Multitool forming tools**.

Each tool is actuated individually and is always available.

The multi-press head guarantees high punch-die alignment precision, and thus machining quality, with reduced cycle times, eliminating in-cycle set-ups and the related waiting times.

The head clearance assures 16 mm forming upwards and 6 mm forming downwards, while the tool stroke control allows precise, high-quality continuous forming (e.g. ribbing).



The multi-press head offers several advantages:

- used to independent processing and precise, high-quality jobs thanks to the tool stroke control;
- minimizes the repositioning needed to move the sheet to the tool;
- reduces cycle time and tool wear;
- improves punching flexibility;
- maximizes productivity in nests that require punchings of different shapes and sizes.

The first set of tools is designed to meet their specific production needs, and is designed to optimize cycle times.



B-type station



C-type station



D-type station

TYPE OF THICK TURRET PUNCHES					
Type station	Force	Diameter	Inserts	Punching	Forming
B	120 kN	31.7 mm		X	X
C	200 kN	50.8 mm		X	X
D	200 kN 300kN	88.9 mm	single	X	X
		31.7 mm	Multitool 3		X
		31.7 mm	Multitool 4	X	
		24.0 mm	Multitool 6	X	
		18.0 mm	Multitool 10	X	
		12.7 mm	Multitool 16	X	

HEAD CONFIGURATION	
Max. number of punching stations	27
Max. number of tools	117
Lower and upper head clearance (mm)	18
Maximum embossing height (mm)	16
Type of thick turret tools:	B, C, D
Number of B-type stations Ø 31.7 mm	7
Number of C-type stations Ø 50.8 mm	12
Number of D-type stations Ø 88.9 mm	2
Number of rotating D-type stations Ø 88.9 mm	6
Options	
Embossing stations with lower cylinder	10 (4B, 2C, 4D)
Electrical tapping unit	installed on the side of the head

High-performance tools

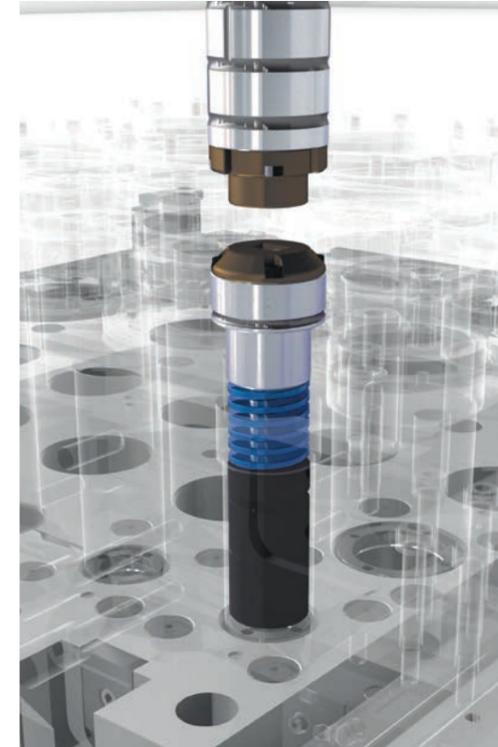


The thick turret tools recommended for S4.G4 are those designed and manufactured by Matrix Tools. On the market for over 40 years, the company covers the whole production chain manufacturing standard, parametric and tailored solutions to meet specific needs, always guaranteeing the highest standards of quality and reliability.

The **punching line** comes from the **Premium series** and offers high performance without compromising on flexibility and simplicity. Punch-holders B, C and D are equipped with the innovative iEM insert.

Jetform and **Rollform** are the specific forming lines. Ventilation fins, extruded holes, clips, hinges and logos are just some of the forming operations possible with Jetform: unique pieces, designed according to the required forming. On the other hand, the Rollform series quickly performs incisions, ribbing and offsets.

MultiMATRIX is the multitool line that reduces re-tooling times while increasing the punching machine flexibility. Each multitool for punching can hold from 4 to 16 tools with variable diameter, from 12.7 to 31.7 mm. The multitools for forming are available in stations of 3 tools, each with a diameter of 31.7 mm. All the tools available in the multitool are rotating and indexable.



Options

The lower cylinders are mounted on hollow cylinders that can also be used as conventional punching stations.



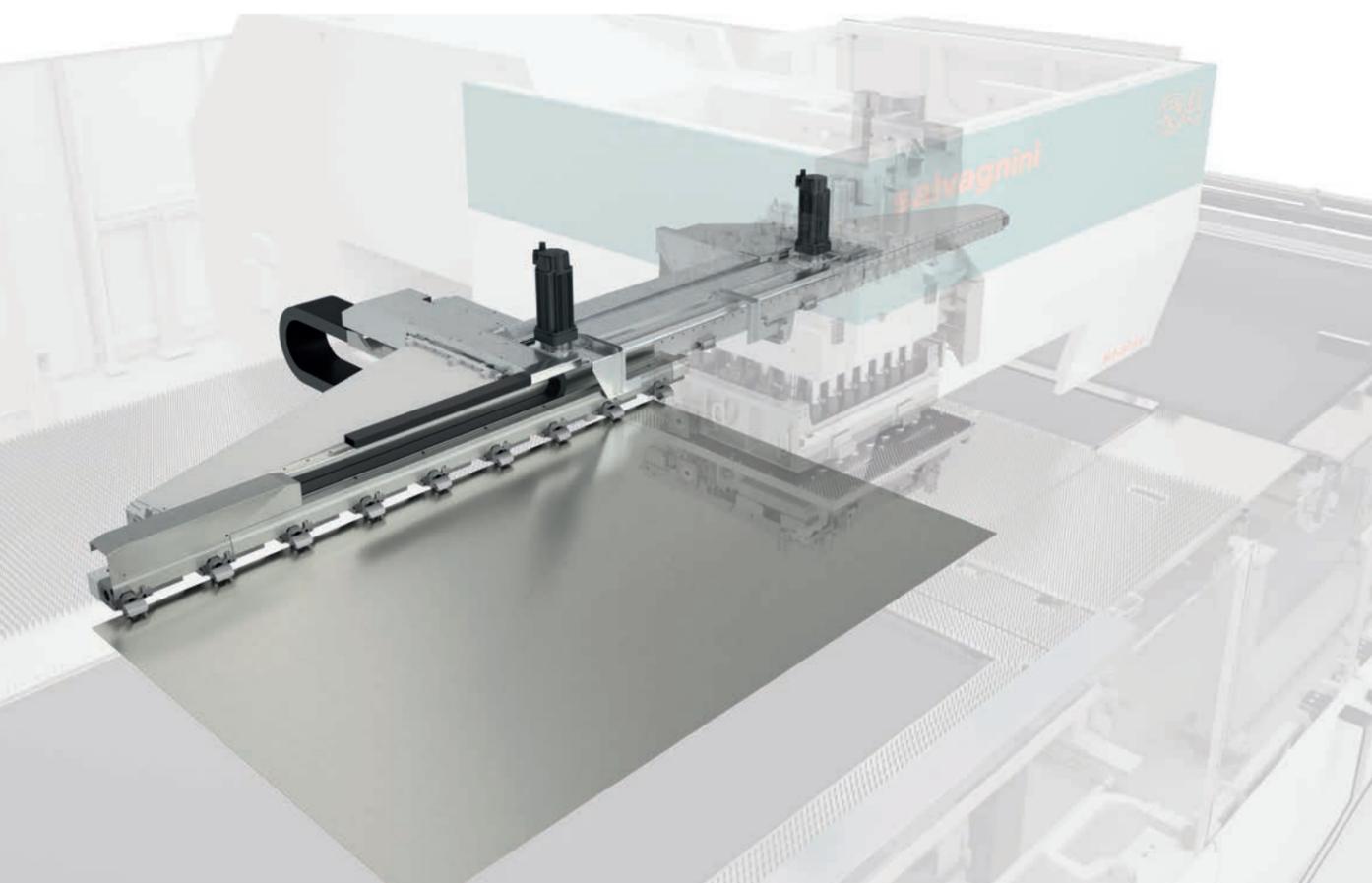
An optional electrical tapping unit, which can house up to 6 different tools, can be installed to the side of the operating head. It does not steal any room from the tools as it is positioned outside the head.

Tools

TOOLS is the new Salvagnini software module for the graphic management of the punching tool database in punching-shearing centers and punch-laser combi machine. **TOOLS** defines the tools interactively and graphically, simplifying the insertion of punches of various shapes (including special shapes) and creating set-ups for punching heads, as well as the agile management of the behavior of each punch and die when associated with different materials and thicknesses. It is also used to correct the punch stroke, edit waiting times for forming, use scrap extraction and control the tapping dynamics, where present in the configuration.



Manipulator: accurate centering and fast scrap-free processing.



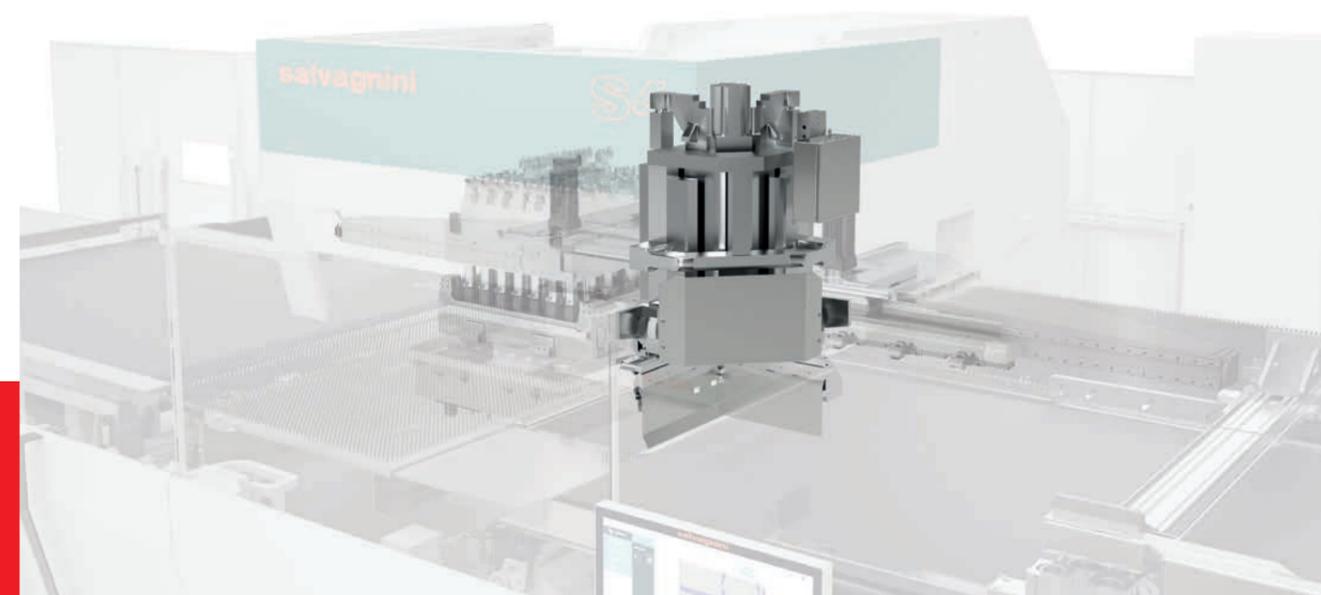
The manipulator centers the sheet when machining begins and keeps it clamped during the punching and separation operations. It has a maximum stroke of 3030 mm which allows sheets of up to 3048 mm to be machined without regripping, and has **9 pneumatic pincers with independent opening and closing**, extending the possibility of machining nests without any holding scrap and reducing scrap. The path and punching optimization algorithm makes it extremely precise and reliable. It has a patented hand-over system that modulates the dynamics according to the weight of the sheet metal being processed.

Integrated shear.

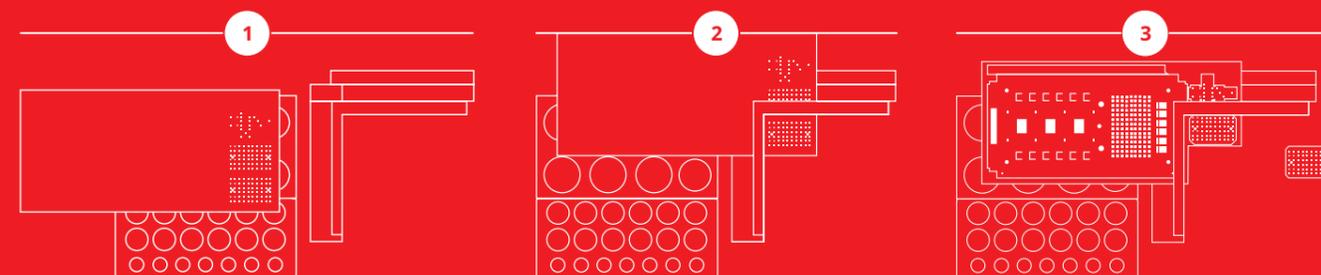
The shear is composed of two 500 mm blades, which are independent and orthogonal to each other, equipped with blankholders, for cutting any length. Installed next to the multi-press head, the shear is part of the same structure: it is a distinctive solution and unique on the market, eliminating the geometric limits due to the head/shear distance and ensuring optimal, constant alignment and superior machining quality.

Like the multi-press head, the shear is also controlled by hybrid actuators that simplify its architecture and reduce consumption. The shear also ensures advantages in terms of process quality as, compared to separation by punch, it reduces the cycle time, does not erode the material, improves optimization and minimizes scrap, making the S4.G4 the perfect combined machine.

Freedom of choice: the shear cuts the sheet metal into parts of any size, with or without holding scrap, choosing the best option for the specific manufacturing requirements.



Balanced production and optimized flow.



In traditional systems, the individual parts in a multiple sheet or nest are separated and unloaded sequentially once the whole sheet has been punched. Salvagnini's Punch&Cut mode groups together the machining operations for each part (1) and

processes them separately (2), improving precision and repeatability by minimizing the stress on the sheet metal, and rapidly feeding the production flow downstream (3) by balancing kit or multiple production batches.

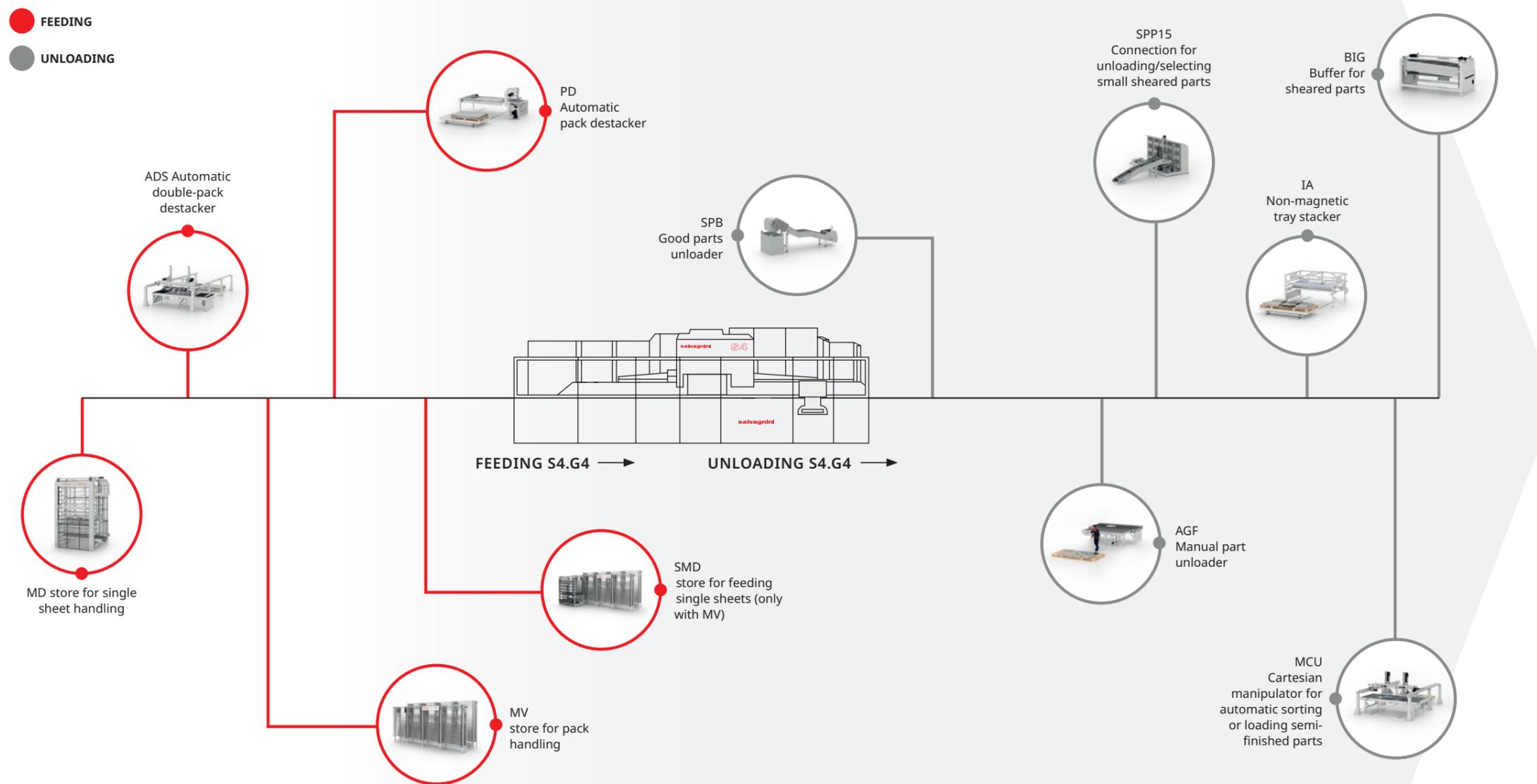
Modular, scalable automation for regaining efficiency.

Automation plays an increasingly important role: it reduces the risk of loading and unloading becoming bottlenecks, and can help to reduce the impact of labor costs.

The Salvagnini loading/unloading and sorting connections satisfy all automation requirements: from stand-alone operation, to integration in flexible cells or in automatic lights-out factories.

What is the best configuration?

Depending on the needs and production strategies, Salvagnini's specialists help each customer to define the most suitable configuration for their production needs, evaluating a number of variables including the field of application, the production strategy and the production mix.



Feeding devices

The S4.G4 punching-shearing center can have different types of feeding connections: from the in-line conveyor to the automatic destacker, from the automatic store-tower to the automatic tray store.

Unloading devices

The punched and/or sheared parts can be automatically directed to collection bins, buffers, one or more stackers, or intermediate stores, or straight to downstream operations.

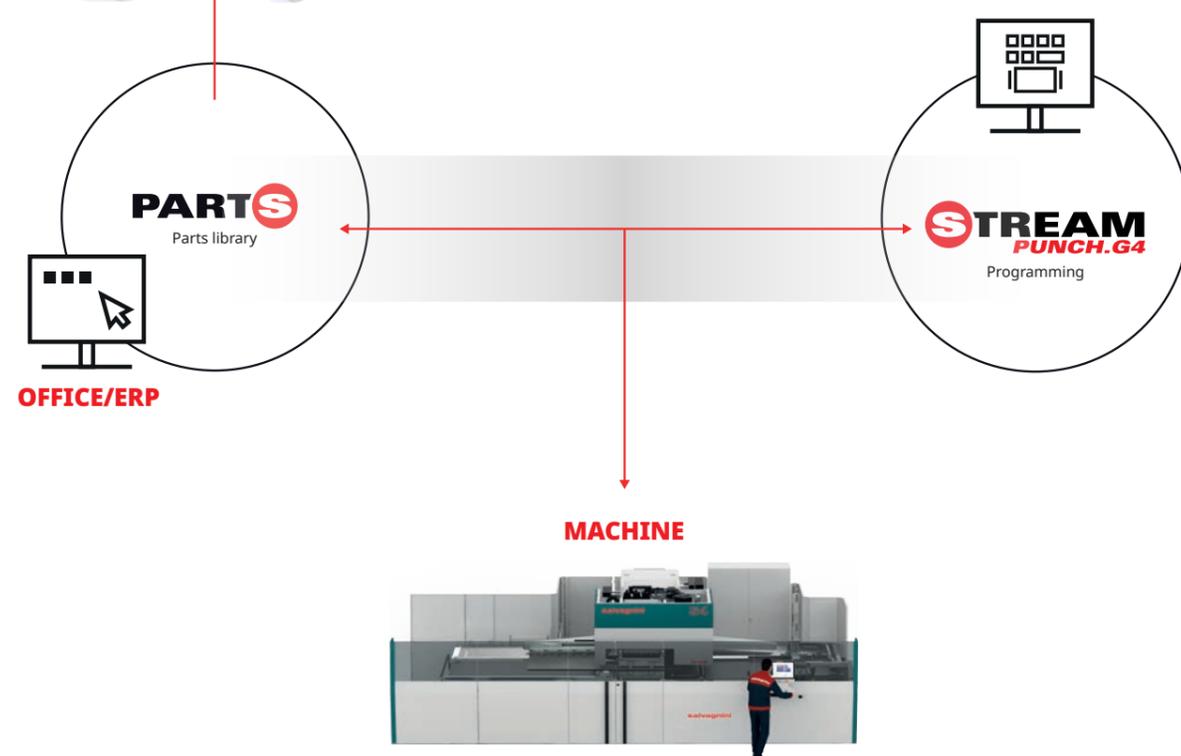
S4.G4 includes solutions for improving handling and selection efficiency for both processing scrap and small good parts unloaded into crates.

The MCS devices collect the scrap in one or more crates. The crate is selected automatically depending on the specifications entered in the punching program and assure the perfect recycling of machining waste.

The SPB and SPP15 options on the other hand collect the semi-finished parts for subsequent jobs in one or more crates on a specific conveyor.

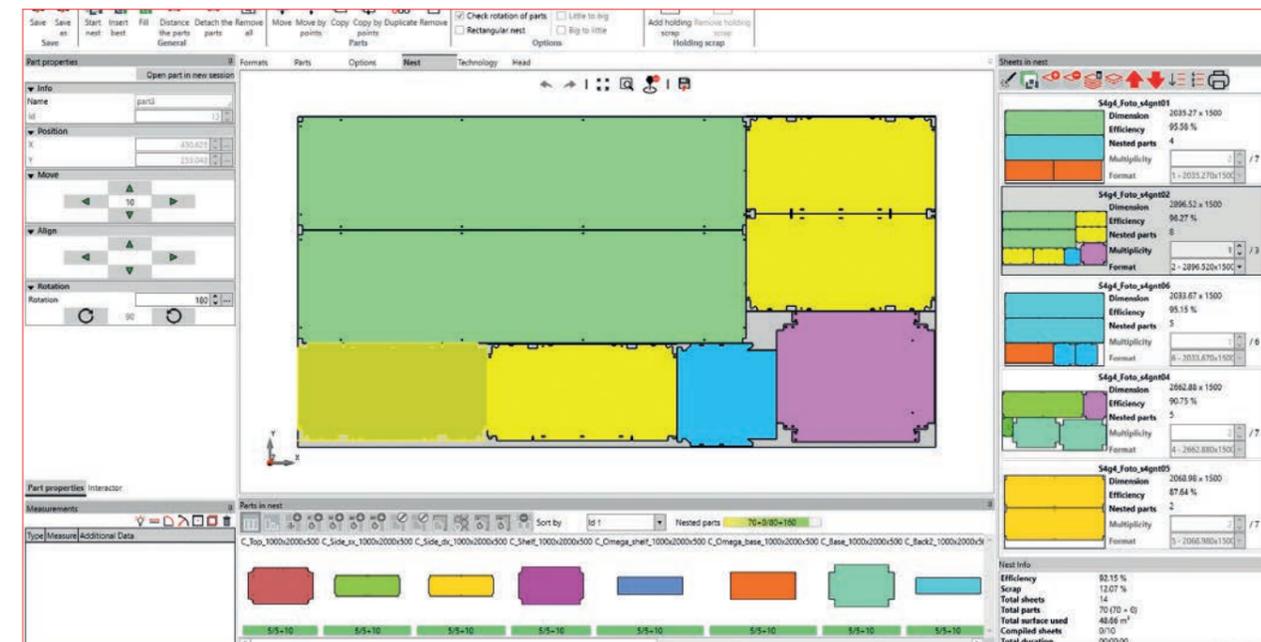
The software ecosystem.

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



It is an integrated environment for **managing all activities in the office and on the factory floor**; it constitutes a single **point of access for all technologies**, from cutting to bending; it is capable

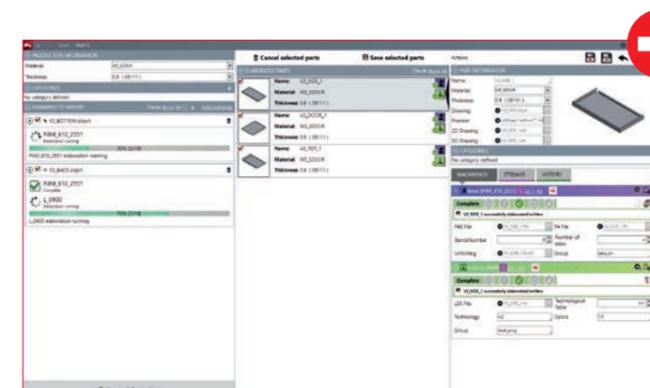
of meeting all planning, programming, production, management, control and optimization needs throughout the production process.



+ STREAMPUNCH.G4

STREAMPUNCH.G4 is the programming software for generating punching and cutting programs. It includes the following functions:

- **CAM**: creates or edits the 2D drawing of the part, and automatically identifies the punches for creating the geometries, punching and shearing sequences and sheet metal handling operations.
- **Nesting**: automatically, semi-automatically or manually optimizes the sheets for production, starting from a production list.
- **OPTI**: high-performing nesting algorithm that optimizes the use of the sheet, increasing process efficiency and minimizing waste.
- **Parametric programming**: function used for nesting parts with different shapes using parametric variables without the need for 2D drawings.



+ PARTS

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

- used to centrally create and modify the single part and nesting programs, for all Salvagnini technologies;
- simplifies nesting and part searches and traceability;
- is integrated with all the CAM/NEST software in the STREAM suite;
- it defines the production flows for each part to be machined;
- makes programming activities more efficient and dynamic in teams with more than one programmer;

Coordinate your factory with OPS in real time.



When adopted, advanced digital technologies can implement and manage complex, integrated, highly automated high-performance systems, and can help to develop simple solutions that require no structural changes to the production layout, making the world of smart manufacturing much more accessible.

In the production equation, OPS, the modular Salvagnini process software, acts as a central coordinator, managing and distributing information among all the environments to make the process truly efficient.

OPS receives the production list in real time from the factory ERP/MRP and supports programming activities, defines the rules and algorithms required to automate the process, adding intelligence to the system.

- OPS can take independent decisions, according to a production logic or a mix of multiple production logics;
- Exchanges information between different technologies, such as the components of an FSJ cell (Flexible Smart Job shop);
- Organizes production, defining priorities, managing any order changes or cancellations and checking the availability of the raw materials or semi-finished parts needed for production;
- Automatically creates punching nests, grouping parts by material, thickness, tool set-up required for any downstream operations, production and job orders;
- Provides feedback to the factory ERP, updating material availability and state of production in real time, part by part;
- Reduces or eliminates any redundant activities with low added value;
- Integrates labeling, traceability and stock management solutions up- and downstream of punching, minimizing error risk and waiting times.

Transforming values into value.

A modular proposal developed across 3 service levels, designed respectively to:



Act

manage everyday needs



Plan

provide preventive maintenance and planning services



Grow

maximize the use and performance of the system

Proximity, reliability and orientation to the future are values that have always been found in the wide range of services available for responding to contemporary challenges.

LINKS

LINKS (ACT) is the IoT solution that improves the overall effectiveness of Salvagnini systems, using the latest business intelligence technologies. LINKS is used to monitor the machine performance and access the production data, logbooks, performance KPIs, telemetry and parameter monitoring, through the Condition Monitoring process.

SupportYou

SupportYou (ACT) is a subscription-based service that manages updates and provides support for using and programming STREAM and all the applications in the office station.

Close2You

Close2You (PLAN) uses LINKS data to offer an overview of the state of health of a system, suggesting the required maintenance interventions according to their criticality and proposing agreed interventions to minimize the risk of malfunctions.

Rethinks

Rethinks (GROW) is the ideal solution for anyone wishing to optimize their production process and improve quality and efficiency, reducing the number of work steps, material usage and costs.

